ELECTRICAL SOUTH

BIRMINGHAM hotels are following the popular trend by ventilating guest rooms and halls with HUNTER ZEPHAIR Air Cooling Systems. • HUNTER engineers have already produced precise performance results which have completely satisfied thousands of hotel and apartment tenants. • HUNTER offers free survey estimates to a limited number of hotel and apartment owners for the coming 1942 season.

HUNTER FAN & VENTILATING COMPANY, INC.

Factory: FULTON, N. Y.

Regional Sales Offices: Memphis, Sterick Bldg. *Eastern Sales Offices:* New York, 92 Warren Street *Western Sales Office:* St. Louis, 1804 Pine Street

Sales Offices:
ATLANTA, BOSTON, CHICAGO, CLEVELAND, DALLAS, DETROIT, HOUSTON, KANSAS CITY, LOS ANGELES, NEW ORLEANS, PHILADELPHIA, PITTSBURGH, ST. LOUIS

1.

2.

3.

HOTELS

1. BANKHEAD
2. DIXIE CARLTON
3. MOLTON

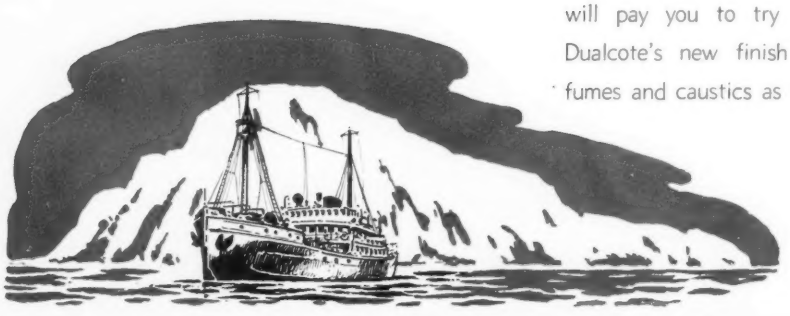
DUALCOTE

travels eighty thousand miles at sea

Strapped on the deck of Admiral Byrd's ship—"North Star," this length of Dualcote suffered all the punishment that nature could inflict during an 18 month voyage at sea. Storms drenched it with salt water, tropical suns beat unmercifully upon it at the Equator, snow, ice and sub-zero cold descended upon it in the long Arctic nights of the South Pole.

This photograph shows the condition of the conduit when the North Star returned. You can see where the salt deposit has been cleaned off that the Dualcote finish is still intact, protecting the zinc coating underneath from being eaten away by the salt water.

No matter what kind of jobs you are planning, it will pay you to try out this new conduit, as Dualcote's new finish stands-up longer in acid fumes and caustics as well as salt water.



We'll gladly send you samples to test out in your most troublesome locations.

WALKER of Conshohocken, Pa.

Represented in the South by:

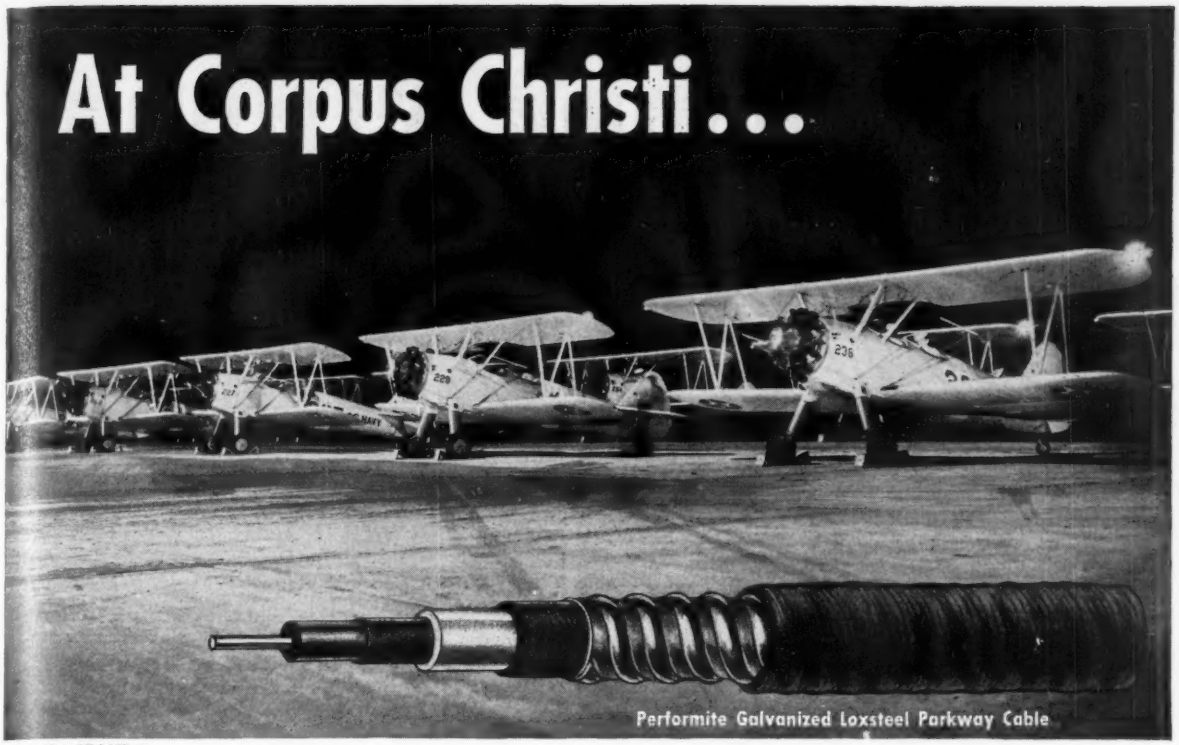
E. B. Glenn
107 Walton St., N.W.
Atlanta, Ga.

J. J. Reilly
1701 Massachusetts Ave., N.W.
Washington, D. C.

E. W. Sturdivant
3306 Wichita St.,
Houston, Texas

ELECTRICAL SOUTH is published monthly by W. R. C. Smith Publishing Co., Marietta, Ga., and Atlanta, Ga., U. S. A.
Subscription rates, United States and Possessions, $1.00 for one year; $2.00 for three years; Canada, $1.50 per year; Foreign Countries, $2.00 per year.
Entered as second class matter at the postoffice, Marietta, Ga., under Act of March 3, 1879.
Volume 21 **Number 9**

At Corpus Christi...

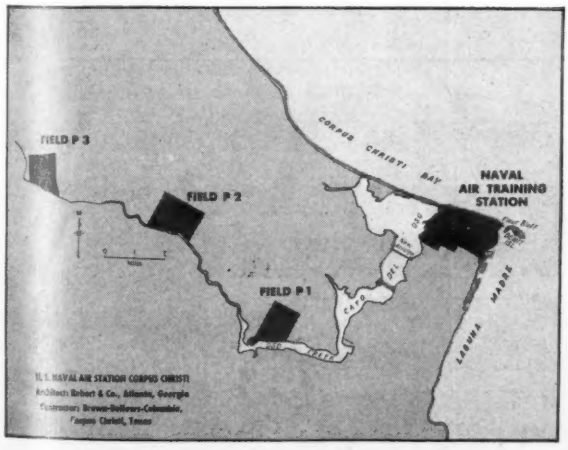


U. S. Navy Official Photo

P-2 Trainers (Night Flight) Ready to Take Off

283,000 Feet of Hazard Armored Cable Light the Way for Eagles and Fledglings

In the electrical distribution system at the new Naval Air Station in Corpus Christi, Texas, over a quarter of a million feet of Hazard Loxsteel Armored cables carry the power for boundary lighting, flood-lights, buildings, hangars and shops.



Built to rigid U. S. Navy specifications JC-121 and JC-106A, these cables also comply with the necessary requirements of the Civil Aeronautics Authority for airport lighting cables.

This outstanding installation at the Corpus Christi airfield follows a long succession of prominent airport lighting jobs from coast-to-coast in which Hazard has been privileged to supply the cables.

Full information on the many Hazard electrical cables for airport, airway and other power and light purposes is yours for the asking. Without obligation, Hazard engineers will gladly assist you in recommending proper cable designs for any electrical application.

HAZARD INSULATED WIRE WORKS
DIVISION OF THE OKONITE COMPANY
Works: Wilkes-Barre, Pennsylvania
Offices in Principal Cities

HAZARD
AIRPORT LIGHTING CABLES

FORTY-NINERS

SCORE 500 VICTORIES FOR BETTER LIGHT-BETTER SIGHT IN 5 MONTHS!

Inspire 50-footcandle installations in stores, offices, and factories where higher lighting levels speed sales, improve work and boost production.

THAT HIGHER LEVELS OF LIGHTING are being sold and bought is evidenced by the 500 50-footcandle installations reported by the Forty-Nine Footcandle Club between March 1, and August 1, 1941. Indicative of the gains that fluorescent lighting is making is the fact that more than 78% of these installations are MAZDA F! Of the 500 installations, 51% are office, 32% are commercial, and 17% are industrial. They cover 2,843,795 square feet—more than 65 acres—and average approximately 3 watts per square foot.

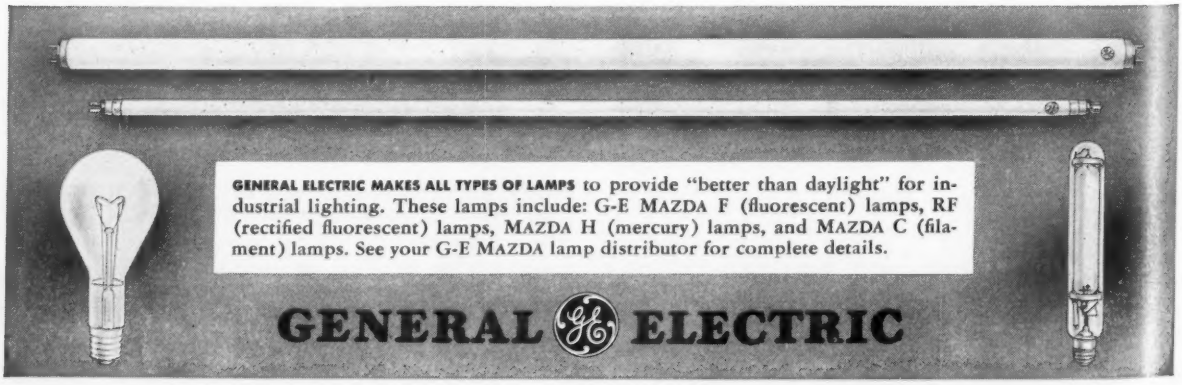
ALL OF THESE INSTALLATIONS represent constructive selling and intelligent buying to provide higher levels of lighting so urgently needed for more efficient working conditions in offices, better selling conditions in stores, and for faster production in industry, especially defense industries. Primarily they demonstrate that more customers have recognized the need for properly engineered lighting . . . the amount of light that helps them work more efficiently.

NATURALLY THERE ARE other 50-footcandle installations scattered throughout the country not inspired by the Forty-Niners' Club, but the fact is that those participating in the 49-Footcandle Club are doing a swell job. If you don't have your share of 50-footcandle installations on your lines, General Electric will be glad to help you organize your own 49-Footcandle Club.

Membership is open to salesmen primarily responsible for selling installations of 49-footcandles or more, or to executives working under 49 or more maintained footcandles. The attractive emblem shown here will be sent to all members. A brief description of the installation, attested by the sales manager, is all that is necessary for membership. Send it to: Secretary, Forty-Niners' Club, General Electric Company, Nela Park, Cleveland, Ohio or consult your G-E Lamp Division.

HIGHLIGHTS OF THE 500 50-FOOTCANDLE INSTALLATIONS

Total Square Feet covered		2,843,795
Total Watts installed		8,529,745
Total number of lamps used		125,928
Total number of fixtures		66,210
Average square feet per lamp for all sources		22.5
DISTRIBUTION OF LIGHT SOURCES:	MAZDA F	78.4%
	MAZDA C (incandescent)	10.4%
	Combination fluorescent and incandescent	6.8%
	RF—85 watt	2.0%
	Combination mercury and incandescent	1.4%
	MAZDA H (mercury)	1.0%
		100.0%


GENERAL ELECTRIC MAKES ALL TYPES OF LAMPS to provide "better than daylight" for industrial lighting. These lamps include: G-E MAZDA F (fluorescent) lamps, RF (rectified fluorescent) lamps, MAZDA H (mercury) lamps, and MAZDA C (filament) lamps. See your G-E MAZDA lamp distributor for complete details.
GENERAL ELECTRIC

GENERAL ELECTRIC PRESENTS NEW 1941 AND 1942 PROGRAM TO HELP UTILITIES PROMOTE

LIGHT CONDITIONING

IT was a big year last year. But it looks puny against the figures that are being chalked up this year. Factories going up everywhere mean more opportunities to sell the new higher levels of lighting that defense work requires. Offices, stores, hotels, restaurants, theatres—the whole commercial field is turning to new higher levels of light. Zooming payrolls spell new opportunities for home light conditioning. Are you getting your share of this business? G.E.'s light conditioning program for 1941 and 1942, geared to the times, will help every utility promote better light for better sight with better results for everyone.

COMMERCIAL AND INDUSTRIAL PROGRAM. *It's fluorescent lighting* that holds the spotlight in commercial and industrial lighting this year. It will continue to do so in 1942. Customers need it—architects and contractors are giving it to them—both in new buildings and remodelling jobs. Here is an opportunity to approach the lighting levels that the Science of Seeing shows are so urgently needed. See that your customers get the *right* levels of fluorescent lighting and that their jobs are properly engineered. It's easy—with G-E MAZDA F lamps and the wide variety of Fleur-O-Lier and RLM fixtures.

G.E. offers you the tools to sell these higher lighting levels in every kind of job. There's the G-E Footcandle Selectometer (shown in cut), a device that lets the customer select for himself the amount of light he prefers. There's a new sales presentation easel and sales manual, slide films, booklets, direct mail pieces, special newspaper mats, a manual of sales ideas—dozens of devices and suggestions for a complete program. Ask your General Electric lamp representative for full details.

HOME LIGHT CONDITIONING PROGRAM. More people are at work today in the United States than ever before in the nation's history—and earning more money than ever before. Nothing at any comparable cost will give them more satisfaction than modern home light conditioning. Better Light-Better Sight activity has laid the educational foundation. Now G.E. proposes a five-year program, starting this year. The goal—light conditioning of two-thirds of our homes! To help utilities, G.E. offers a hard-hitting sales promotion and advertising program that can be tailor-made to suit any utility's own operating set-up. See your G-E lamp representative today.

G.E. Backs Up Light Conditioning Program with Big Advertising Push this Fall!

HUNDREDS OF MILLIONS of copies of national, big circulation magazines carry the G-E lighting and lamp story to consumers this year. "The G.E. MAZDA Hour of Charm," with Phil Spitalny and his All-Girl Orchestra is on the air every Sunday evening. Advertising in the principal business papers will help boost MAZDA F sales. Outdoor posters will go up on boards in all major cities this month. Special tie-in displays will provide more point-of-purchase power than ever before. See your G-E lamp representative. Find out how G-E's advertising can lay an effective background for your own local campaign!

You are cordially invited to visit the G-E Exhibit, Booths 9 and 10, at the I.E.S. Convention in Atlanta, September 22nd-25th.

G-E MAZDA LAMPS
GENERAL ELECTRIC

Made to stay brighter longer

TOLERANCE

We know only too well how much you need steel. We are doing everything humanly possible to get it for you. Every man in this company is doing his utmost to produce every possible pound of material.

Because of the seriousness of this nation's emergency, defense must come first. We are cooperating with the Government to the limit as you would want us. At the same time we are keenly aware of the needs of our customers, and we are doing our best to serve you, too.

Tolerance is one of the virtues that will help tremendously in this hour of our country's need.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN, OHIO

WOULD YOU BELIEVE IT?

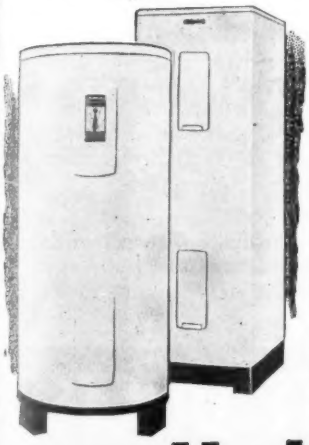
MIRACLES WITH HOT WATER

EVERY DAY IN MODERN HOSPITALS THERAPEUTIC TREATMENT OF CERTAIN AILMENTS EFFECTS REMARKABLE RESULTS. IN TODAY'S HOMES A HOTPOINT ELECTRIC WATER HEATER KEEPS WATER READY FOR ANY EMERGENCY **DAY** OR **NIGHT.**

OF THE 25,200,000 WIRED HOMES IN THE U.S. ABOUT

4%

HAVE ELECTRIC WATER HEATERS! A GREAT MARKET LIES AHEAD!



THINK of it! Eight out of nine homes have no automatic hot water service whatsoever. Then, too, new home building and modernizing is skyrocketing. Defense spending is turning loose a flood of eligible buyers right in your territory. It's a huge market—and it's yours! Get your share of this business with Hotpoint—the best known and most complete line in the industry. And Hotpoint gives you powerful sales promotion aids. Send the coupon today, NOW, for complete information. Edison General Electric Appliance Co., Inc., 5614 W. Taylor St., Chicago, Illinois.

COPPER 99 51/100% PURE

IS USED IN MAKING TUBING- FROM WHICH THE **CALROD IMMERSION UNIT** IS MADE. ONLY THE FINEST MATERIALS ARE USED IN **HOTPOINT ELECTRIC WATER HEATERS** WHICH ACCOUNTS FOR THE FACT THAT LAST YEAR **HOTPOINT** OUTSOLD ALL OTHER MAKES!

AUTOMATIC ELECTRIC Hotpoint WATER HEATERS

ELECTRIC RANGES • REFRIGERATORS • WASHERS AND IRONERS • CLOTHES DRYERS
AUTOMATIC DISHWASHERS • ELECTRASINK • STEEL KITCHEN CABINETS

Edison General Electric Appliance Company, Inc.
5614 West Taylor Street, Chicago, Illinois

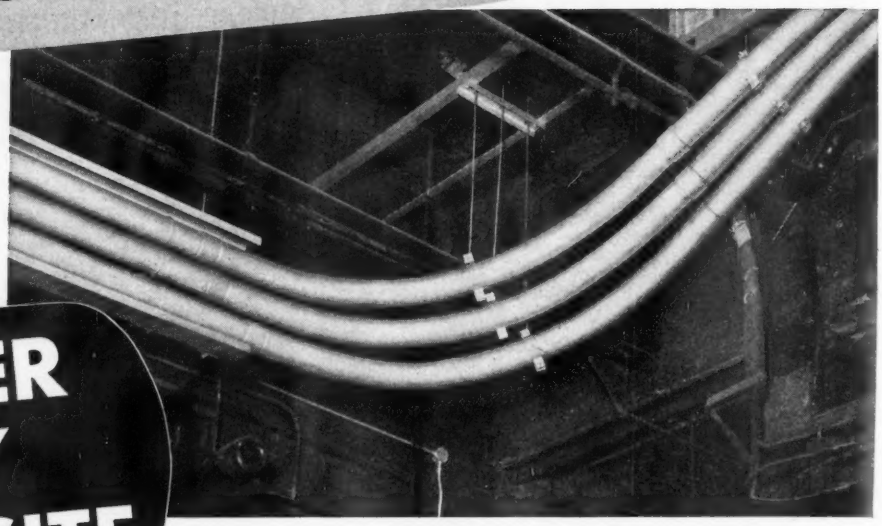
Please send me full information about Hotpoint Automatic Electric Water Heaters.

*Name*_____

*Address*_____

*City*_____ *State*_____

Looking for a duct that controls induction losses?



BETTER TRY TRANSITE

On single-phase alternating-current lines, the asbestos-cement composition of Transite Ducts reduces induction losses to a minimum.

INDUCTION LOSSES are practically zero when you use J-M Transite Ducts. This means that these asbestos-cement cableways are ideal for carrying single-phase alternating-current lines. And whether used above ground, below ground or on exposed locations, Transite Ducts provide these additional advantages:

Low Installation Costs: Light in weight, easy to handle and assemble, Transite Ducts save time on any job. Underground, Transite *Conduit's* strength eliminates the expense of a concrete casing. Where a casing is required, thinner walled, lower priced Transite *Korduct* is recommended. Its long lengths require fewer joints, spacers and supports. And both Transite *Conduit* and Transite *Korduct* have a smooth bore that assures easy cable pulls at all times.

No Fire Hazard: Made of asbestos and cement, Transite Ducts cannot burn. On multiple-duct, concrete-encased systems, Transite *Korduct* provides the equivalent of extra fire-protection between cables without extra cost. And neither Transite *Korduct* nor Transite *Conduit* will contribute to the formation of combustible fumes or gases.

Low Maintenance Costs: Being non-metallic and inorganic, Transite Ducts won't rust or rot. On exposed locations, Transite Conduit effectively resists weather, smoke and fumes. Underground, it offers unusual resistance to corrosive soils . . . holds its strength and true form under sustained earth loads and traffic pressure.

• • •

For full details on both Transite Conduit and Transite Korduct, write for brochure DS-410. Johns-Manville, 22 East 40th Street, New York, N. Y.

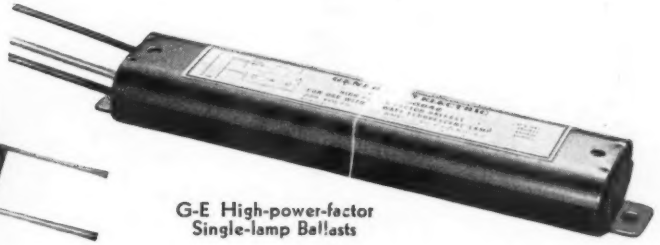
Johns-Manville TRANSITE DUCTS

***Transite Conduit*—for exposed work and for installation underground without concrete encasement.**

***Transite Korduct*—for installation in concrete. Thinner walled, lower priced, but otherwise identical with Transite Conduit.**

For RELIABLE, LOW-COST High-power-factor Fluorescent Installations

G-E Tulamp Ballasts



G-E High-power-factor Single-lamp Ballasts

FOR a very small increase in over-all fixture costs, all the important advantages of *high power-factor* are available for fluorescent-lamp installations. Fixtures equipped with G-E high-power-factor, single-lamp ballasts or Tulamp ballasts operate at power-factors of 90 per cent or above and comply fully with all power-factor regulations of public utilities and regulatory bodies. G-E high-power-factor ballasts provide important installation and operating economies. They give:

1. Greater capacity of wiring by reducing the current required by each lamp—thus reducing wiring costs on new installations.
2. Lower losses and better voltage regulation in feeders and branch circuits—for improved performance and economy.

In addition, reliability and long life are built into every G-E ballast. Designs are carefully co-ordinated with lamp characteristics. Modern manufacturing facilities such as automatic coil-winding machines assure uniformity of characteristics in all ballasts of the same rating. Depending on rating, every ballast receives from 7 to 10 separate tests during manufacture.

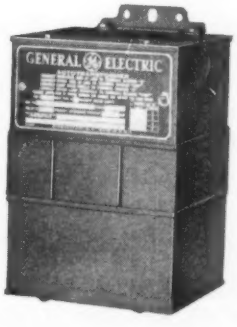
All G-E ballasts are listed by the Underwriters' Laboratories, and all G-E Tulamp ballasts are certified by the Electrical Testing Laboratories.

These factors—correct design, careful manufacture, and thorough testing—combine to make G.E.'s the best buy in ballasts.

EXTRA SAVINGS WITH G-E TULAMP TRANSFORMERS FOR MERCURY LIGHTING

G-E Tulamp transformers for MAZDA H (mercury) lamps offer all the advantages of high-power-factor fluorescent ballasts—plus extra savings in installation cost. By using one transformer to supply two outlets, wiring is simplified, and installation time and costs are reduced.

The use of G-E Tulamp transformers (available for the 400-watt MAZDA H lamp) adds only about 3½ per cent to the over-all cost of transformers, lamps, and fixtures. Single-lamp high-power-factor transformers are available for both the 400-watt and 250-watt lamps.

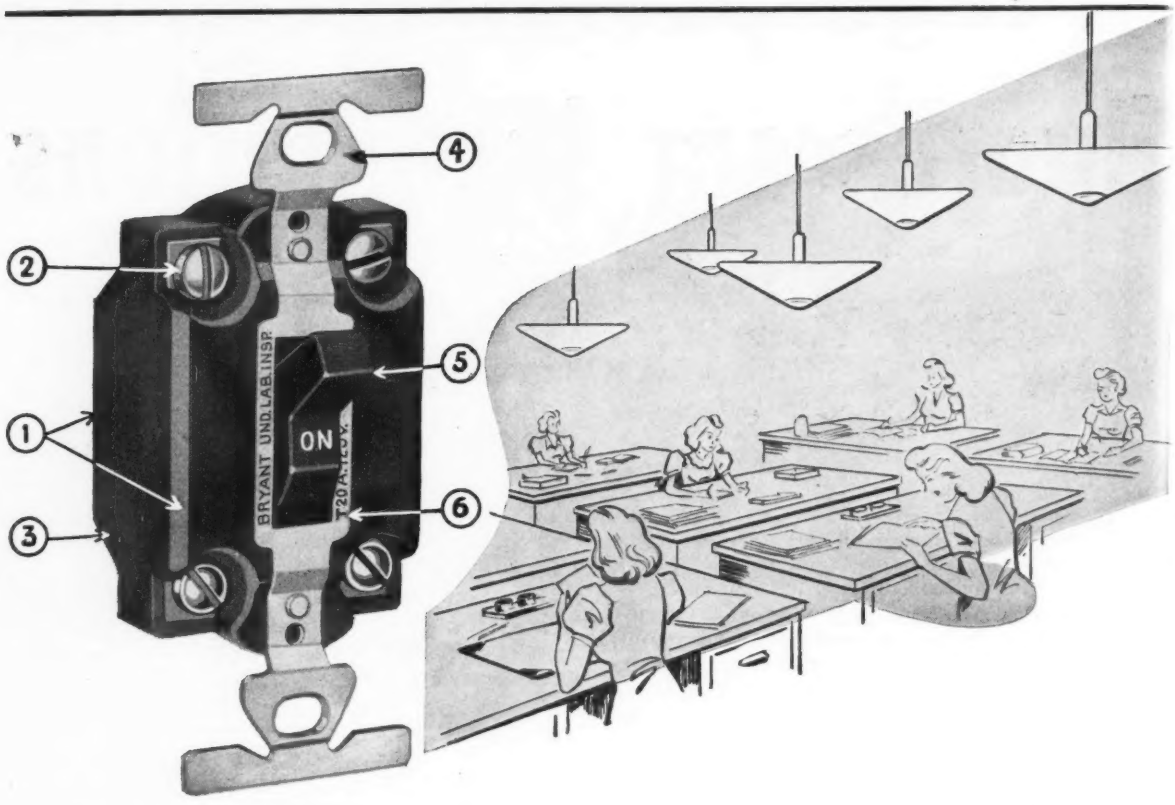


Ask the nearest G-E distributor or G-E office for complete information—Bulletin GEA-3293, "Ballasts for Fluorescent MAZDA Lamps," and Bulletin GED-855, "Transformers for MAZDA H Lamps." General Electric Co., Schenectady, N. Y.

GENERAL ELECTRIC

406-1-5805

New Shallow 20 Ampere Switches



All The Time-Proved Features Plus Important New Ones

BRYANT

SUPERIOR WIRING DEVICES

SOLD THROUGH ELECTRICAL WHOLESALERS NATIONALLY

1. 1½ INCHES DEEP—Fits shallow boxes.
2. EASY TO WIRE—Large binding screws recessed to facilitate wiring.
3. BAKELITE ENCLOSED—Fully enclosed in rugged bakelite.
4. INSULATED YOKE—One-piece design yoke, with plaster ears. Completely insulated from mechanism.
5. UNBREAKABLE PLASTIC HANDLE—Made in Brown, Ivory and Black. Also available in Lock and Momentary types.
6. FULLY APPROVED — U. L. "T" Rated. Conforms with Federal Specifications.

CATALOG NUMBERS

Single-Pole . . .	No. 5861	Three-Way	No. 5863
Double-Pole . . .	No. 5862	S. P. Quad. Break . . .	No. 5866

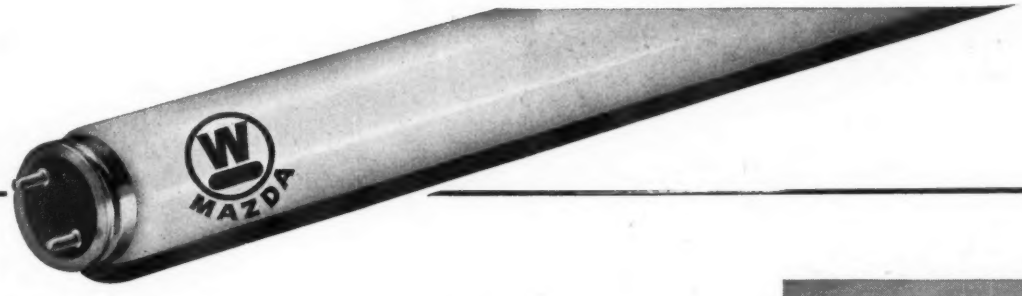
The new Bryant Shallow 20 Ampere Switches give extraordinary performance at ordinary prices in both industrial and commercial service. Write for new device page 50-B.

The Bryant Electric Company, Bridgeport, Connecticut

ADEQUATE WIRING SERVES AND SAVES

EVERY OUTLET DESERVES A BRYANT DEVICE

Let's Make the Most of FLUORESCENT



IN the rush to buy this more efficient kind of light, a great many installations have been made without the benefit of thorough planning and engineering.

True, in many cases the user got more light. But all too often he did not get *enough more*—usually much less than the 50 foot-candles or better, needed for today's selling and production.

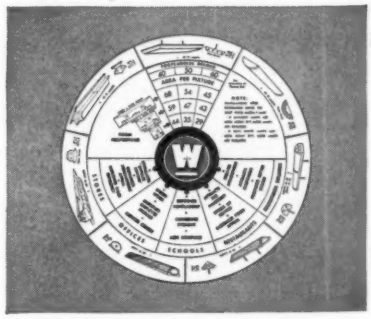
Everyone of these sub-standard installations is a missed opportunity to further the progress of better light.

Recognizing this, Westinghouse is making every effort to help with the job of telling the public the true facts about fluorescent.

For example, we now have ready for your use a wide variety of direct mail literature, booklets and folders which will emphasize to your customers the need for expert help in buying fluorescent lighting.

Also, we have developed an ingenious Fluorescent Fixture Selector as a handy aid in calculating the right kind of equipment for any particular lighting job.

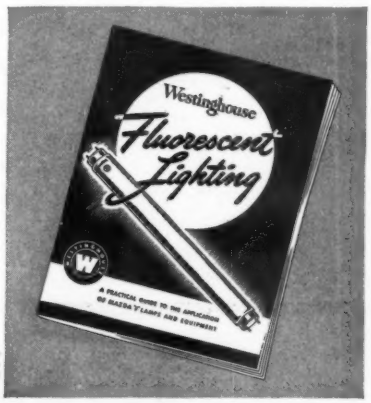
These and other helps are described in the new Westinghouse Fluorescent Lighting Plan Book. We suggest that you write for a copy. WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, LAMP DIVISION, Bloomfield, N. J.

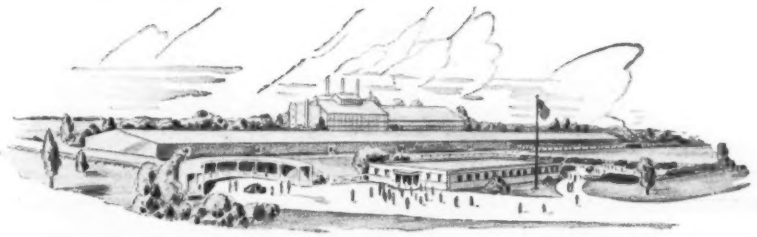


The new Fluorescent Fixture Selector shows at a glance what fixtures will give high level lighting for any area.

•

This 24-page "Guide to the Application of Fluorescent Lighting" is one of the many Westinghouse publications that will help you get this new kind of lighting sold right.

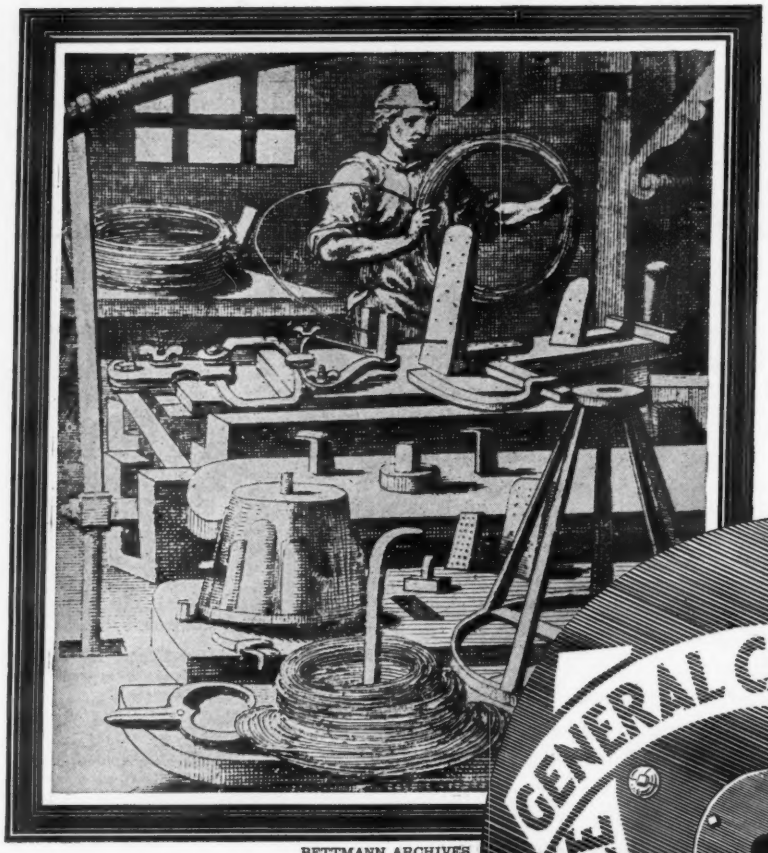




A million Westinghouse Mazda F Lamps a month! That will be the capacity of this new Westinghouse Plant, recently completed at Fairmont, West Virginia.

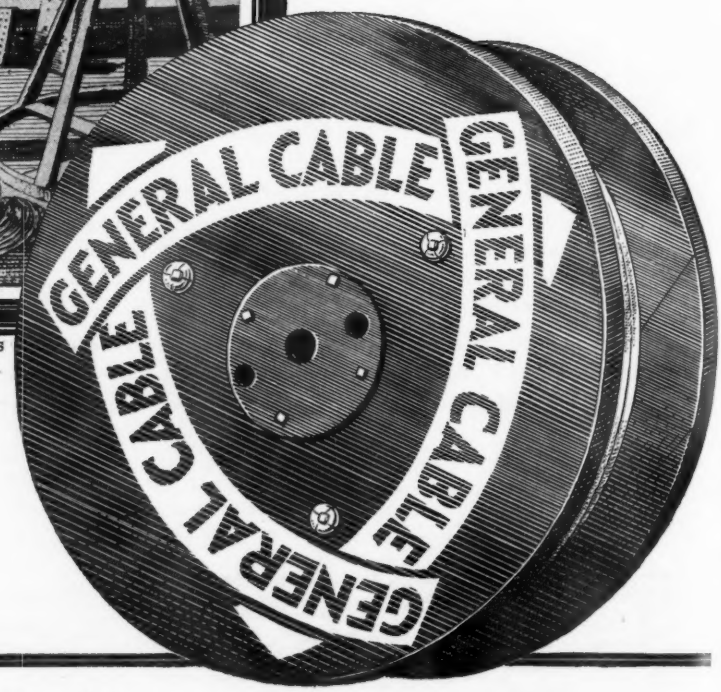
Westinghouse Mazda F Lamps

FOUR HUNDRED YEARS AGO, for wire of quality one sought out an individual reputed to be a superior craftsman. In these days of vast manufacturing enterprise, reputations are just as solidly built and for similar reasons. Of General Cable, it has now been custom for two generations to expect and receive quality in product and in service.



BETTMANN ARCHIVES

Here preserved in copperplate engraving is the wire-drawing shop of the 17th century. Chances are that a good part of the product was of the same all-useful red metal.



GENERAL CABLE

BARE and INSULATED WIRES and CABLES for EVERY ELECTRICAL PURPOSE

STOCKED BY ELECTRICAL WHOLESALERS EVERYWHERE

General Cable Corporation Sales Offices: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON KANSAS CITY (MO.) • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROME (N.Y.) • ST. LOUIS • SAN FRANCISCO • SEATTLE • WASHINGTON (D.C.)

H & H SWITCHES

FOR THE WHOLE ROUND OF WIRING JOBS

Why not demand the "freedom of choice" of a really complete line of switches? Here's the *full* selection you need, — 50 years in the making! Fifty years of switch-making have rounded out its VARIETY; proved out its RELIABILITY.

Every switch illustrated is *specification grade,* T-rated. Every type is provided for residential, institutional and industrial installations. Ratings: 10 to 30 Amperes. Handles of brown Bakelite or white Ivorylite. Bases of molded materials or porcelain.

Your own interests are served in the largest measure by the *largest line.* And this, to you, is our special offering as the makers of the MOST COMPLETE Wiring Device line.

HART & HEGEMAN DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.

NOW... *Service-Free, Trouble-Free Fluorescent Activating Units!*

Power Unit No. 999...Model No. 240 by

NATIONAL TRANSFORMER CORP.

with these unusual features:

1. No Starters Needed
2. No Starter Sockets Needed
3. No Compensator Needed
4. Full Brilliancy
5. No Radio Interference
6. Dependable Performance
7. Virtually Non-Stroboscopic
8. Stabilized Lamp-Life
9. Power Factor Corrected Above 90%
10. Lower Temperature Striking; also lower line voltage striking
11. Easily Installed
12. Underwriters-Approved
13. Underwriters - Approved Lampholder Model S-1735
14. Guaranteed for One Year

Sold Only Through Reputable Fixture Manufacturers

National Transformer Corporation No. 999 power units are not a hasty development to take advantage of a growing market, but are designed and constructed to eliminate the principal sources of complaint against starting troubles and problems of a similar nature in the fluorescent lighting field. Basic patents were granted on this circuit in 1933 for interior illumination, and basic patents have been issued in Canada, England, France and Australia, with other patents pending.

Members attending the IES Convention, Sept. 22-25, are invited to inspect the installation at Gulf Oil station at Sixth and West Peachtree streets, next door to the Biltmore Hotel.

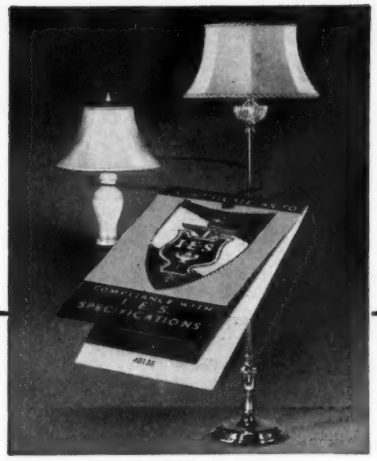
IMPORTANT!

NOTE: *Cold Cathode* illuminating amplifiers, sockets and fluorescent lamps for OUTSIDE installations available on preference ratings for airports, Navy, Army, defense manufacturers, etc.

If Not Available in Fixtures Sold by Your Distributor, Write Immediately for Details to

NATIONAL TRANSFORMER CORPORATION

224 TWENTY-FIRST AVENUE — PATERSON, N. J.



THANKS TO THE

Illuminating Engineering Society

FOR THEIR GIFT

TO THE Illuminating Engineering Society, a nation-wide group of lighting experts, who during September hold a national convention in Atlanta, the I. E. S. Better Sight Lamp Makers publish this expression of appreciation for the 54 specifications used in making I. E. S. lamps.

Their 54 specifications revolutionized the portable lamp industry. They changed the portable lamp from a purely decorative object to a fine, scientific lighting instrument that the lamp makers clothe with the utmost in beauty and style.

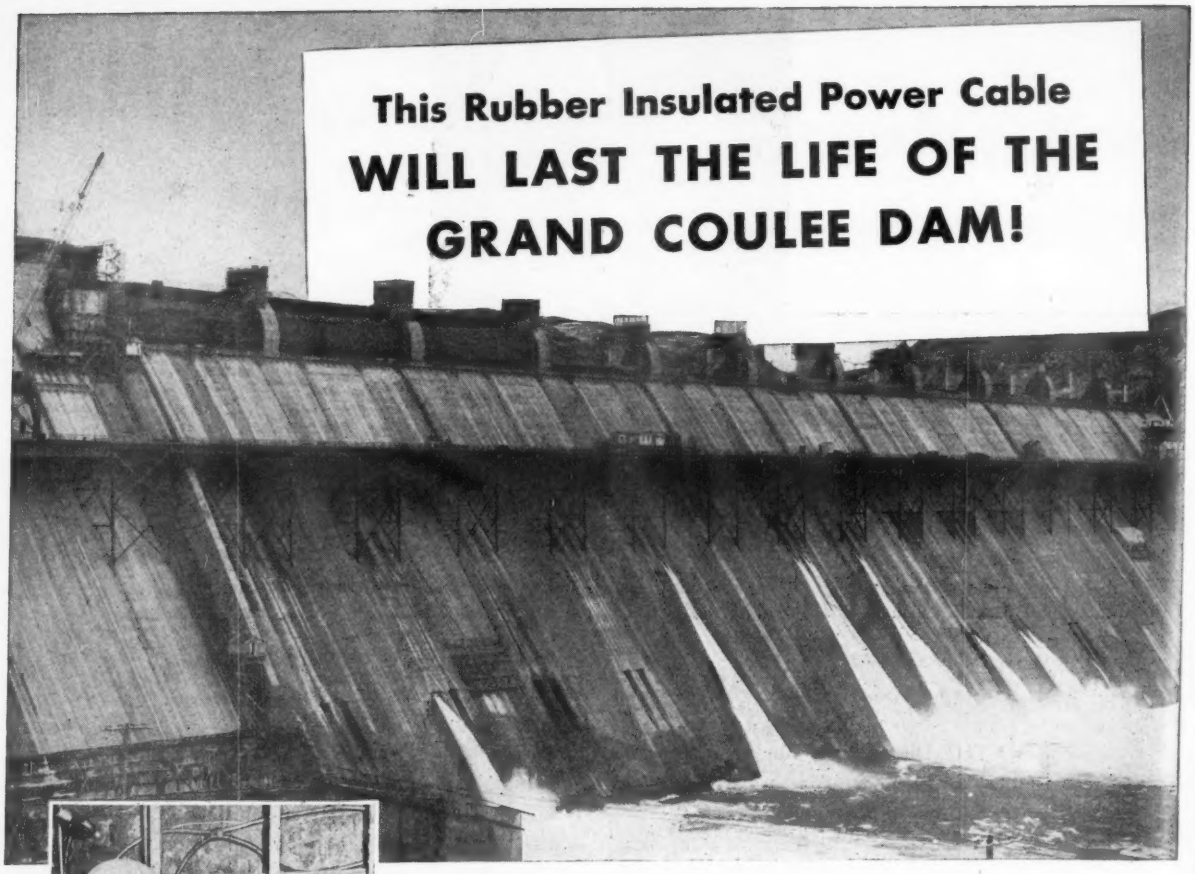
Thanks to the Illuminating Engineering Society, countless numbers of boys and girls and men and women of all ages have a warm spot in their hearts for I. E. S. lamps. They know that an "I. E. S." lamp makes the easy chair a more comfortable reading spot, the study table a more friendly place for the eyes. They may not know the name of the organization, but their gratitude to it is none the less real.

The extra light and freedom from glare featured by the original lamp was extended to all types of lamps. Today Certified I. E. S. Lamps are made in nine different types, all embodying the original principles: table lamps, floor lamps in two types, end-table lamps, wall types, swivel arm bridge types, plain bridge types, junior floor types and torcheres. Certified I. E. S. lamps challenge the world for beauty and style, as they challenge it for structural and lighting superiority. Over six millions have been sold. Millions more will be bought. Human eyesight is protected by their use.

Any lamp manufacturer can build lamps according to I. E. S. specifications, but not one can designate his lamp as an "I. E. S." lamp unless it is also checked and *certified* by the Electrical Testing Laboratories, New York, for strict compliance with all 54 I. E. S. specifications.

The lamp manufacturers and the lamp sellers of America are grateful to the Illuminating Engineering Society. To them we extend congratulations and sincere thanks for a splendid gift.

I·E·S BETTER SIGHT LAMP MAKERS



TYING *Amarine Rubber Insulated Cables in position prior to pouring of concrete.*

A.S.&W. AMARINE 40 *is buried for life in the cement gates of Grand Coulee Dam . . . an important part of the induction heating system that will prevent the freezing of these gates.*

WHEN a permanent heating system to de-ice the eleven huge gates of Grand Coulee Dam was considered necessary—A.S.&W. Amarine 40 was furnished as the conductor. This cable will be buried for life in the concrete of the gates.

Back in 1909, American Steel & Wire Company made the first non-leaded submarine cable, insulated with a special water-resistant rubber compound now called Amarine.

One of these cables, after 27 years of continuous operation immersed in water, was recently brought up for inspection — and found to be in excellent condition, still good for many more years of service.

This is only one of the instances that prove the outstanding lasting qualities of Amarine. No other non-leaded submarine power cable can even approach this record. It takes years to measure the life expectancy of an electrical power cable. No laboratory test has yet been devised that exactly reproduces the conditions of actual service.

That's why American Steel & Wire Company bases all cable recommendations on actual performance, and never on empirical short-term tests. That's why Amarine was accepted by Grand Coulee Dam Engineers.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* — United States Steel Export Company, New York

UNITED STATES STEEL

Certified
FLEUR-O-LIER
The Manufacturer guarantees by affixing this label that this Fluorescent Luminaire is a duplicate of samples found by periodic examination to comply with the minimum requirements as set up in the
"SPECIFICATIONS FOR LUMINAIRES, FITTINGS AND AUXILIARIES FOR FLUORESCENT LAMPS"
which are sponsored by the Manufacturers of Mazda Lamps.
ELECTRICAL TESTING LABORATORIES
NEW YORK, N. Y.
E.T.L.
A COPY OF THIS CERTIFICATE SHOULD APPEAR UPON EACH UNIT OR PACKAGE
E.T.L.
THIS CERTIFICATION IS CONTINGENT UPON EMPLOYMENT OF CERTIFIED AUXILIARIES OF OVER 95% POWER FACTOR

Look for THIS LABEL

TO BE SURE OF GETTING DEPENDABLE FLUORESCENT LIGHTING FIXTURES

(I)

These 3 SAFEGUARDS ASSURE YOU OF SAFE, SATISFACTORY PERFORMANCE

TESTED! Famous Electrical Testing Laboratories put FLEUR-O-LIER fixtures through exhaustive tests, which include such vital points as FLICKER CORRECTION, DURABILITY AND SAFETY, EASE OF MAINTENANCE, DEPENDABLE BALLASTS AND STARTERS, EFFICIENT LIGHTING PERFORMANCE, AND HIGH POWER FACTOR (OVER 85%).

CERTIFIED! Based on these tests, Electrical Testing Laboratories gives the FLEUR-O-LIER manufacturer the right to affix the label of certification to all fixtures identical to the sample submitted. This label is your assurance that the fixture wearing it meets the 50 rigid specifications set up by MAZDA lamp manufacturers for better light, better service. E. T. L. maintains a constant check-up of random sample fixtures—thus assuring *uniform quality.* You can buy Certified FLEUR-O-LIERS with confidence!

GUARANTEED!

FLEUR-O-LIER
Manufacturers
GUARANTEE
This certified Fleur-O-Lier, when properly installed and equipped, is guaranteed to be free from defects in material, workmanship or assembly for a period of ninety (90) days from date of delivery to purchaser. Should any such defects appear within that time and under normal conditions of use, the undersigned company will furnish new material or parts in exchange for any found defective and will correct any faulty workmanship or improper assembly.
Fleur-O-Lier specifications require the use of certified auxiliary parts.
(NAME OF MANUFACTURER)

IMPORTANT!
Before you buy fluorescent check with your local electric service company. They will give you expert advice on how to install fluorescent fitted to your specific needs.

WIDE VARIETY! You can get Certified FLEUR-O-LIERS in over 100 different designs and in a wide range of prices.

FLEUR-O-LIER
Manufacturers

Participation in the FLEUR-O-LIER MANUFACTURERS' program is open to any manufacturer who complies with FLEUR-O-LIER requirements

TEAR OUT AND MAIL

Fleur-O-Lier Manufacturers • 2149-9 Keith Bldg., Cleveland, Ohio

Please send me FREE new booklet "50 standards for satisfaction," together with list of Fleur-O-Lier manufacturers.

Name _____

Address _____

City _____ State _____

Coolair
TRADE MARK

INDUSTRIAL FANS AT WORK

Alert COOLAIR dealers have profited from these large industrial and commercial installations in various parts of the United States.

TUF-NUT Garment Manufacturing Co., Little Rock, Ark., bought ten 56-inch 2 HP Coolair Exhaust Fans to assure a complete change of air each minute.

Threads, Inc., ... Gastonia, N. C. are using four 56-inch — 1½ HP, one 28-inch, and three 56-inch — 1 HP Coolair Exhaust Fans.

Johnson-Carper Furniture Co., Roanoke, Va., installed three 62-inch — 3 HP, one 56-inch — 1 HP, one 50-inch — 1 HP, and eight 28-inch Coolair Fans.

Imperial Sugar Company, Sugarland, Texas, bought nine Coolair Exhaust Fans to breeze-condition their plant. They ordered three 7-foot — 5 HP, one 32-inch twin — ½ HP, two 24-inch — ¾ HP, and three 50-inch — ¾ HP.

National Linen Service Corp., Atlanta, Ga. now has a total of 57 large Coolair Exhaust Fans in their plants in 29 cities.

Crystal Springs Shirt Co., Crystal Springs, Miss., has five Coolair 62-inch — 3 HP Fans in service.

Duval Laundry, ... Jacksonville, Fla., equipped its plant with ten Coolair Exhaust Fans ranging in size from an 8-foot — 7½ HP to a 32-inch — ¾ HP Fan.

Bucyrus-Erie Co., ... Evansville, Ind., found that three 50-inch Twin — 1½ HP Coolair Fans did a good job of breeze-conditioning.

Wembley, Inc., . . . New Orleans, La., are now Coolair boosters with one 62-inch — 1 HP, one 50-inch — ½ HP and two 50-inch — ¾ HP Fans.

The Elmore Corp., . . . Spindale, N. C., utilize four 44-inch — ¾ HP Coolair Industrial Exhaust Units.

National Container Corp., Jacksonville, Fla., purchased one 62-inch — 2 HP and two 38-inch — ¼ HP Coolair Fans this year.

Imperial Laundry Co., . . Little Rock, Ark., breeze-condition with six 62-inch — 3 HP Coolair Units.

Wuederman Cleaning & Dyeing Co., Cincinnati, Ohio, are equipped with three 62-inch — 3 HP Coolair Exhaust Units.

Carolina Mirror Corp., North Wilkesboro, N. C., have turned their breeze-conditioning problems over to three 32-inch — ½ HP and three more 28-inch — ¼ HP Coolair Fans.

MAIL THIS COUPON TODAY!

AMERICAN COOLAIR CORPORATION
Jacksonville, Florida.

Rush me complete details on Coolair Fans.

NAME ----------

ADDRESS ----------

CITY ---------- STATE ----------

The Booming Industrial Field Offers You New Profit Opportunities Through COOLAIR

You snatch extra profits right out of the air with COOLAIR Fans and here's *8-point proof* to show you *quickly* how you can keep step with the largest, fastest-moving industrial building program that our nation has ever seen.

The many factories and industrial plants that are already benefiting from COOLAIR Industrial Exhaust Fans have established breeze-conditioning as a necessity for efficiency in high-speed production. Step right in now with the many alert *Coolair* dealers that are already taking advantage of this new market. Enjoy greater turnover—greater customer satisfaction—greater profits.

1. Coolair's extra-quality rigid construction, precision-built frames and reinforced blades mean *economical performance, customer goodwill* and practically *no service calls to eat up your profits.*

2. Coolair can supply you with almost *immediate shipments* in spite of the fact right now sales records are being smashed that have stood through Coolair's 14-year history together with a general tightening up by suppliers of raw materials.

3. Coolair Fans are available to you in *21 sizes* from 16 inches to nine feet in diameter with various motor sizes for each to assure you of the correct size equipment for any job that comes your way.

4. Coolair's *patented* built-in springs *eliminate vibration* noise on installations where quietness is essential. This is a feature found in no other fan.

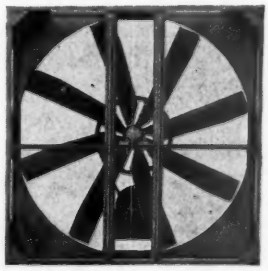
5. Coolair installs *oversize ball bearings* for *lifetime service* to your customers.

6. Coolair Fans conform to *certified air ratings,* according to ASHVE Test Code.

7. Coolair's *streamlined inlet* on models O and OT *reduces power consumption* and avoids blade-tip "spill-off."

8. Coolair Fans are precision made so that you may *be sure* that you are giving your customers the best fan that they can buy.

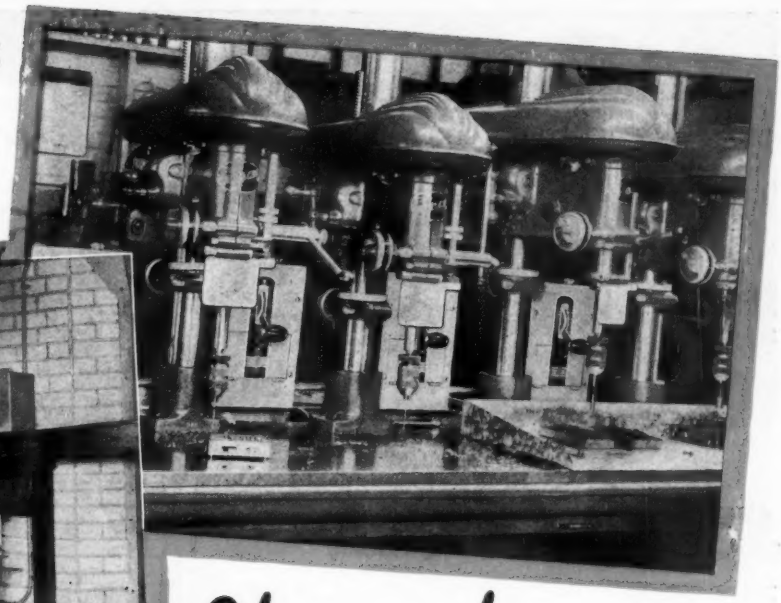
Act NOW! Every day lost means lost opportunities and lost profits for you. Every industrial plant without Coolair Equipment is a prospect, every buyer a booster. Our engineering consultants are at your service for advice and technical assistance. Send coupon for illustrated catalogue that will give you complete details on Coolair Fans.



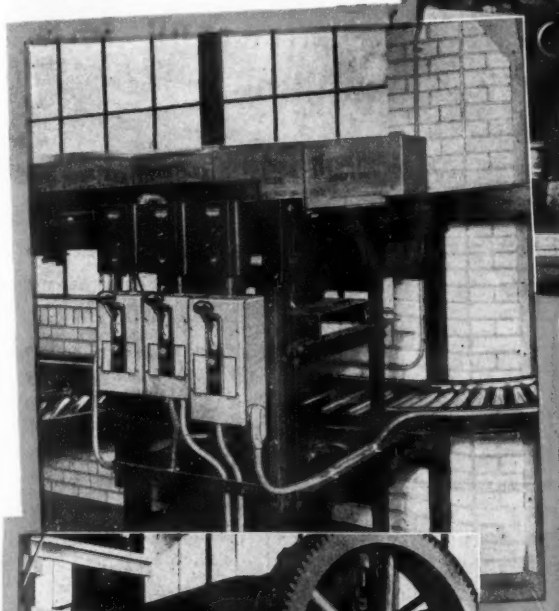
Coolair Ventilating and Cooling Systems

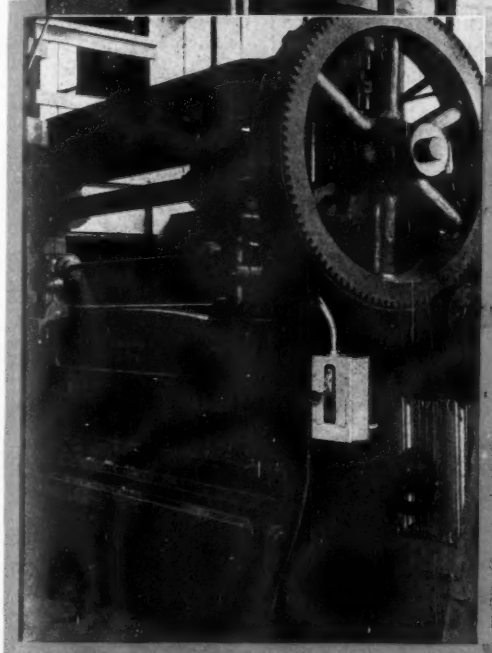
AMERICAN COOLAIR CORPORATION
Manufacturers . . . . JACKSONVILLE, FLORIDA

Cat. No. SA3333 SHUTLBRAK Switches mounted directly on a multiple spindle drill press—within easy reach of operator.

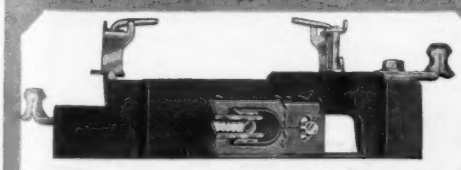


Conveyor system controlled by two 30 amp. and one 60 amp. SHUTLBRAK Switches, grouped for easy access.





Cat. No. SA6333 (FA) SHUTLBRAK Switch used on a heavy forming press.



Detail of Shuttle Assembly, showing ON position of Contacts.

Play safe—

use the Safety Switch

with the new switching principle—the

(FA) Shutlbrak Switch

This is a front operated switch, embodying *entirely new ideas in both design and construction.*

The line and load switch parts are enclosed in the completely insulated shuttle, which contains the movable make and break elements—the auxiliary contacts on the ends of the compression spring, and the main contact roller. All current-carrying parts are silver plated for low resistance contacts.

The switch is equipped with (FA) Kamklamp fuseholders for either ferrule or knife blade types of fuse terminals. The switchbox is finished in attractive gray enamel and has ample room at top, bottom and behind the switch unit for wiring and connecting space. The entire assembly may be removed from box for greater ease in pulling in wires.

The (FA) Shutlbrak switch is available either with or without an interlocking arrangement between the operating switch lever and the door of the fuse compartment. It may be had for either surface or flush mounting.

The (FA) Shutlbrak is a high quality, horse-power rated, heavy duty industrial switch for motor control, service entrance, or any installation requiring an operating switch.

Capacities at present: 30 to 400 amp., inclusive, for 250 volts AC or DC, and 575 volts AC, in 2, 3 and 4 poles. (Larger capacities in preparation.) Approved by Underwriters' Laboratories as an Enclosed Switch.

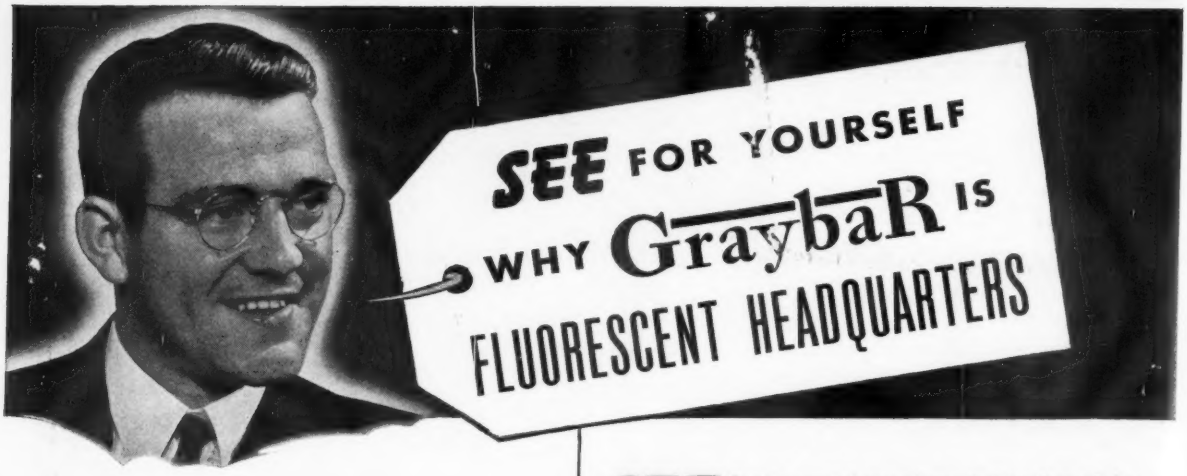
For detailed information and prices write for Bulletin No. 59. Frank Adam Electric Company, St. Louis, Mo.

ESY. THE SIGN OF A (FA) 1891 BETTER JOB

Frank Adam

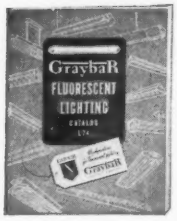
1891 FIFTY YEARS SERVICE 1941

FRANK ADAM ELECTRIC CO. ST. LOUIS, MO. U.S.A.



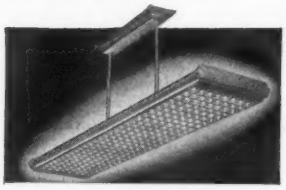
SEE FOR YOURSELF WHY GraybaR IS FLUORESCENT HEADQUARTERS

SEE this comprehensive 86-page "tell-all" Fluorescent Lighting Catalog



Its 86 pages are crammed full of essential fluorescent facts. It contains illustrations . . . light output figures . . . distribution curves . . . dimensional drawings . . . specifications . . . list prices . . . for more than 70 industrial and commercial fixtures. In addition, it answers questions about fluorescent lighting, discusses servicing and tells how to design a lighting installation for any desired illumination level. For a copy of Catalog L-74, call your local GRAYBAR office or Representative.

SEE that your supply source can furnish the exact type of unit you need



GRAYBAR offers industrial fluorescent units for general or localized lighting, normal or high illumination levels, open or enclosed, including Benjamin "Streamliter" and "Lite-Line", Wheeler "Day-Flo" and other types with "Fleur-O-Lier" approval. Also commercial types by Wakefield, Silvray, Curtis, Day-Brite, Mitchell. For up-to-the-minute information on new types, call GRAYBAR. Call GRAYBAR, too, for General Electric Mazda F (fluorescent) lamps, Underwriters' Approved Accessories, ballast transformers, starters, and the like.

SEE these experienced specialists for advice on commercial and industrial lighting

GRAYBAR has a staff of lighting specialists with years of practical experience in fitting lighting to the job—particularly skilled on industrial lighting problems where seeing tasks are highly critical. These men are available to work with contractors, plant engineers or utility lighting engineers in solving problems of glare, shadow control, color discrimination and other factors essential to well engineered lighting.

SEE how this nationwide distribution network can help meet your needs

GRAYBAR has more than 80 distribution points from coast to coast with local stocks of most of the things you need for installation, extension or maintenance. Adequate resources and skilled management help GRAYBAR to stock its warehouses so as to serve you with the least possible delay and the human minimum of "mix-ups". Right now, local GRAYBAR managers are doing their best to anticipate customer needs.

Put Your Lighting Needs Up to . . .

GRAYBAR ELECTRIC COMPANY

In Over 80 Principal Cities

Executive Offices: Graybar Building, New York, N. Y.

GraybaR

HEADQUARTERS for FLUORESCENT

LAMPS—ACCESSORIES—REFLECTORS

GraybaR QUALITY — *Everything Electrical* — GraybaR ELECTRIC COMPANY

Tender regards from women in love...

with their WESTINGHOUSE Appliances

Love 'em and leave 'em? Sell them and forget 'em? No, sir! That's *not* the Westinghouse philosophy. Our dealers thrive on repeat customers; the kind of folks who, having used and liked one Westinghouse product, are soon in the market for another.

So Westinghouse holds tight to bonds of friendship. We make it a point to know who uses our appliances... how they like them ... and if servicing is satisfactory. This kind of wooing is important. It builds good will for all Westinghouse dealers.

Our follow-through is by ringing doorbells and writing letters to find out how America lives with their Westinghouse appliances. One evidence is a recent survey; a letter from Julia Kiene, manager of our Home Economics Department, with an accompanying post card asking for comments.

And then the deluge . . . thousands of replies from all over the country. Space permits only a random handful of quotations from a mail pouch full of *tender regards from women in love with their Westinghouse appliances.*

REFRIGERATOR

"It's the very best. I recommend it to everybody. Find it very saving in electricity."

Mrs. H. R. L., Detroit, Mich.

RANGE

"Perfect! Clean and reasonable to use. No guesswork as to degree of heat desired. After 35 years use of all other stoves, it is the best."

Mrs. J. W. K., Lake Worth, Fla.

WATER HEATER

"I cannot praise this heater enough as its efficiency is enough to make me forget that I need hot water. It is always there on tap."

Mrs. T. B., Chicago, Ill.

WASHER

"Excellent. Do average of 12 washings a week and no repairs. I have used several makes of machines and would not exchange it for any of them."

Mrs. V. B., Savannah, Mo.

IRONER

"It has given me excellent service. No repairs or adjustments. I wouldn't part with it."

Mrs. J. P., Progress, Pa.

ROASTER

"Completely satisfied. Couldn't hope for any better."

Mrs. B. S., Evansville, Ind.

IRON

"The performance of my iron has been perfect and I am satisfied in every way. Ironing has been made much easier."

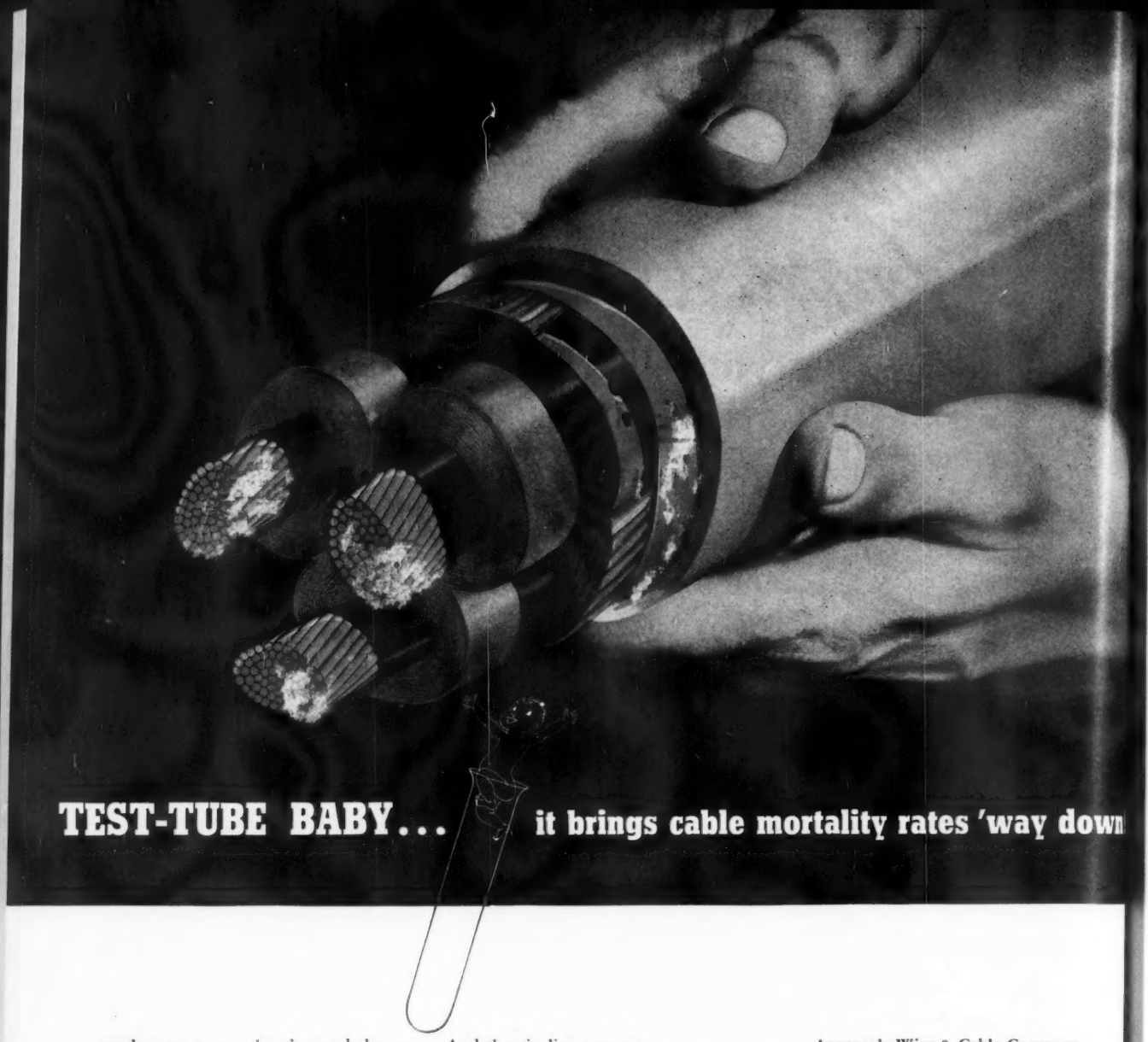
Mrs. W. S., Portland, Oregon

P. S. TO DEALERS—In your community, there are hundreds of users who feel this same way. And hundreds of others who would like to. Now is the time to cultivate them.

The emergency program scarcity will not last forever. And dealers who are alert now will harvest most after Uncle Sam no longer needs basic materials for defense.

Westinghouse

THE *Leisure Line* OF ELECTRIC HOME APPLIANCES



TEST-TUBE BABY... it brings cable mortality rates 'way down

IT'S NOT a very handsome baby as babies go. But, in action, you'll recognize a great basic improvement in impregnated paper power cable. It is Anaconda's new construction known as Type CB*.

It was born in the Anaconda laboratories, when an engineer applied the principle of conditioning oil by the introduction of carbon black, in a series of experiments then being carried on.

This principle when applied to paper-insulated oil-impregnated cable more than trebled the life of the cable, under accelerated aging tests.

And therein lies a story:

It is the story of Anaconda research... research that has produced scores of test-tube babies whose method of creation has been a boon to wire and cable users. In addition to Type CB, there is Sunex Securityflex*, the cable that operates as efficiently 10,000 ft. high in the mountains as 3,000 ft. below the earth's surface.

There are a host of other Anaconda products with special properties for standard and special wire and cable requirements . . . one or many of which may suit your particular conditions. Put them to work for you! *Reg. U. S. Pat. Off.

Anaconda Wire & Cable Company
General Offices: 25 Broadway, N. Y. C.; Chicago Office: 20 North Wacker Drive. *Subsidiary of Anaconda Copper Mining Co.* Sales Offices in Principal Cities. 4198

ANACONDA
from mine to consumer

This familiar trademark identifies Anaconda products. It symbolizes the best efforts of man and science

USE MODERN IMPROVED
ANACONDA WIRE AND CABLE

SEPTEMBER
1941

Volume 21 No. 9

ELECTRICAL SOUTH

J. C. MARTIN, Manager
RICHARD P. SMITH, Promotion Manager
W. E. COOGLER, Production Manager

Editorial and Business Offices
GRANT BUILDING
ATLANTA, GEORGIA

MEMBER OF A. B. P.
MEMBER OF A. B. C.

ANNUAL SUBSCRIPTION—$1.00
THREE YEARS—$2.00
CANADA—$1.50; FOREIGN—$2.00

Business Representatives:
L. E. ALLEN, 189 West Madison St., Chicago, Ill. Tel: Lakeview 10282.
L. R. MCCARTY, 325 Winding Way, Merion, Pa. Tel: Merion 1066.
W. A. MCGEE, P. O. Box 562, Charlotte, N. C. Tel: 3-4932.

Published Monthly by
W. R. C. SMITH
PUBLISHING CO.
Marietta and Atlanta, Ga.

W. R. C. SMITH, *Chairman of Board,*
W. J. ROOKE, *President,*
T. W. MCALLISTER, *Vice-President and Editorial Director,*
E. W. O'BRIEN, *Vice-President,*
R. W. PHILIP, *Vice-President,*
RICHARD P. SMITH, *Vice-President,*
O. A. SHARPLESS, *Treasurer,*
J. C. MARTIN, *Secretary,*
E. L. PHILPOT, *Asst. Secretary and Treasurer.*

Publishers Also of
COTTON
SOUTHERN HARDWARE
SOUTHERN AUTOMOTIVE JOURNAL
SOUTHERN POWER AND INDUSTRY

T. W. McALLISTER, Editorial Director CARL W. EVANS, Editor
NAT M. JOHNSON, Southwestern Editor

Contents

Atlanta Convention Brings Lighting Engineers South 23
A. D. Cameron, President, Illuminating Engineering Society

Dramatizing Sales Appeals Increases Lighting Sales 24
P. M. Rutherford, Dallas Power and Light Company

Today's Opportunities for Increased Lighting Sales 26
Roy A. Palmer, Duke Power Company

Leaves from a Notebook on Fluorescent Lighting 27
O. P. Cleaver, Westinghouse Electric & Mfg. Company

Modern Lighting for Industry 32
Willard C. Brown, General Electric Company

Modern Lighting for Merchandisers 36
D. P. Caverly, Hygrade Sylvania Corporation

Getting Good Performance from Fluorescent Lamps 38
Phelps Meaker, General Electric Company

Contractor Lighting Sales Aided by Training Program 41
L. H. Houck

Fluorescent Lighting Adds Glamour to Stage Shows 43
Ward Warburton

Three Million Square Feet Lighted by G-E "Forty-Niners" 44

Lighting Progress in the South—A Pictorial Review 49

NECA Annual Convention to be Staged in Houston 63

Inspectors Will Discuss Electrical Code in Miami 64

News of the Electrical Manufacturers 65

News of the Electrical Industry 72

Review of New Lighting Products 84

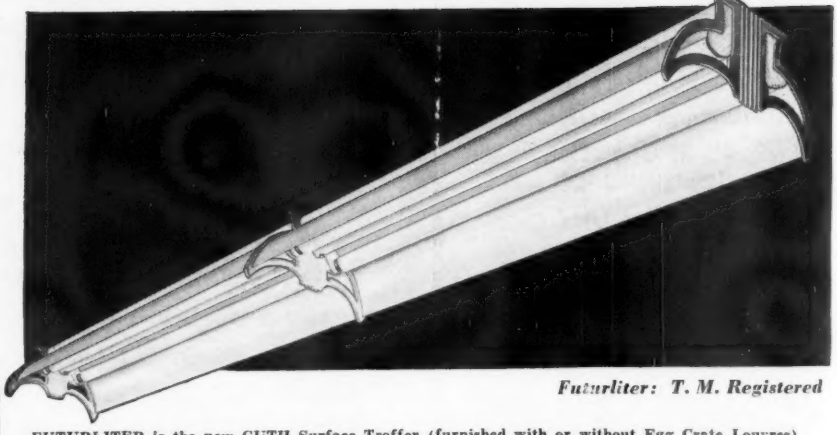
Copyrighted 1941, W. R. C. Smith Publishing Co., Atlanta, Ga.

Entered as second class matter at Marietta, Ga., U. S. A., under Act of March 3, 1879.

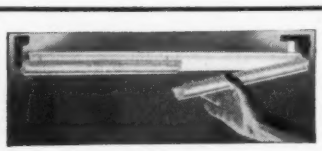
How to Make SALES ZOOM UP!

Feature Guth FUTURLITER FOR "Eye-to-the-Future" FLUORESCENT PLANNING!

Here's the Fluorescent Fixture that's already proved itself to be the biggest thing in the business! It combines amazing light efficiency with utterly new, streamlined beauty! It opens up a brand new group of prospects for you—the men who have been waiting for "the last word in Fluorescent." You'll find yourself sailing right along on the sales you'll build with the GUTH FUTURLITER!



Futurliter: T. M. Registered



P F C Plastic Diffuser

Add beauty and comfort to Fluorescent Lighting. Snap GUTH PFC's on bare lamps to reduce surface brightness.

FUTURLITER is the new GUTH Surface Troffer (furnished with or without Egg Crate Louvres) which provides "Tomorrow's Lighting—TODAY!" With Futurliter, you can sell prospects on the advantages of "Eye-to-the-Future" Planning—offering them a permanent lighting system with a flexible foot-candle capacity—without expensive replacements and alterations.

Beautifully designed and scientifically engineered, the FUTURLITER provides a tremendous amount of quality illumination with comfort and coolness. The FUTURLITER may be mounted individually or in continuous runs; attached directly to ceiling or suspended—and requires only one wiring outlet per unit on entire run.

Write for Full Details Today!

THE EDWIN F. GUTH COMPANY
2615 Washington Avenue **St. Louis, Mo.**

Guth

"LEADERS IN LIGHTING SINCE 1902"

ELECTRICAL SOUTH

SEPTEMBER, 1941

ATLANTA CONVENTION BRINGS ILLUMINATING ENGINEERS SOUTH

The annual convention of IES, to be held in the South for the first time, will be distinctly a working occasion.

By A. D. Cameron*
President
Illuminating Engineering Society

THE 35th Convention of the Illuminating Engineering Society meets at a time which is critical in the affairs of the country and of our Society. It is fitting that it should be in Atlanta, the historical center of the Southeast. It is important that we review the opportunities and responsibilities which are before us.

The Illuminating Engineering Society has reached a stage of growth at which the vigor of youth is combined with the knowledge which comes only from years of experience. We come then to a point where our effort can be wisely directed—where mature consideration does not impede swift action —where we may be of the greatest possible service.

It is well that this is so—never was the need greater for these qualities. Everything this nation stands for since its inception, in fact everything which civilization has achieved in centuries of struggle for personal freedom, is being challenged. The world today needs technical minds. The world to come will need them even more. It is engineers who must plan and execute the means for our protection. It is the engineer who must reconstruct our country and rehabilitate many of its citizens when peace comes and life returns to normal channels.

Already the majority of our members are independently serving the needs of the nation. Many are enlisted or commissioned in the military service, others in important civilian capacities are directing the might of light toward the production of necessary materials and the protection of plants, structures and projects against sabotage and espionage. Officially the Society has been connected with this effort since the very beginning of the emergncy. Its representative is a member of the National Technological Civil Protection Committee. Problems are arising with respect to many phases of the application of light in the National Defense Program. Our services are being accepted for their solution.

The Atlanta Convention will be distinctly a working occasion.

●

THE 35th Annual Convention of the Illuminating Engineering Society will be held at the Atlanta Biltmore Hotel, September 22-25. Because this is the first IES convention ever to be held anywhere in the South—because the eyes of lighting engineers throughout the country will be on the South's lighting progress and development—and because lighting is still the largest single revenue producer of the electrical industry, ELECTRICAL SOUTH devotes practically all of this issue to the subject of Lighting.

With the rapid changes in light sources and luminaires, with new processes requiring new lighting solutions and with the necessity for speed in planning and production, the need for concerted action is vital. The following are some phases which will be presented and discussed:

1. **Lighting for Production.** Methods, technique, and desirable intensities for speeding the production of essential defense material as installed in the newest manufacturing plants will be thoroughly described, illustrated and discussed.

2. **Blackout.** Visual aids to civilian circulation and military movement under blackout conditions will be described from the basis of current practice in Eng-

*Mr. Cameron is vice president of the Holophane Company, New York City.

land with suggested adaptations to meet our own requirements. Undoubtedly discussion will develop the apparent failure of complete blackouts to protect cities from bombing, and perhaps the suggested use of light rather than its absence.

3. **Fluorescent.** In a review of the past year's experience in relating this new light source to public use, various papers will discuss improvements in laboratory development, as well as technique of application in various fields.

4. **Street and Highway Lighting.** Fatal traffic accidents have reached an appalling rate. Unless immediate measures are taken, 40,000 will be killed this year and over 150,000 seriously injured. With troop movements for training purposes, with concentrations of workers at defense plants, and with increased transportation of essential materials by truck, we have reached the proportions of a national disaster. The majority of these accidents occur at night. There are means for correcting this situation and there is actual proof of their effectiveness. There will be an entire session of the I. E. S. Street Lighting Committee which no public spirited official of a private or municipal utility can afford to miss.

5. **Technical.** New principles of fundamental relations between methods and results will be disclosed by scientists who have spent their careers in laboratory analysis of fundamental and basic considerations. It is on the foundation of such a technical knowledge that successful application must be based.

6. **Lighting Service.** The entire opening day of the Convention will bring together public utility lighting engineers from all over the country to present practical solutions for actual lighting problems. Actuated by a spirit of service to the public, this session will be one of the most useful and vital of the entire Convention.

7. **Exhibits.** A feature not always combined with Society Conventions, but which will be available this year, will be a complete exhibit from all principal national manufacturers of their latest developments in lighting, lamps and fixtures. This is in effect a preview of the available tools which the engineer will use in meeting the problems of the year to come.

The Illuminating Engineering Society is a non-commercial, non-profit organization. It has a total membership of over 3300. It is the scientific and engineering stimulus for the lighting industry. It has members in every state and in twenty-four foreign countries, branches in twenty-four large cities of the United States and Canada and official representatives in fifty-three other cities. It is the only national organization in the illumination field whose entire resources are devoted to the advancement of the lighting art. Through all the years of its existence the Society has maintained a happy balance designed to interest all of its members. It has an economic, a technical and a scientific viewpoint. Since its founding there has been no abatement of the search for new knowledge and new methods, of the helpful sharing of experience in the practice of the art, or of zeal in generous service to the public. Enterprise, high purpose and good will pervade the organization.

The Society's interests are as extensive as vision itself. They extend wherever light is used to increase efficiency and production, and to promote the safety, comfort and happiness of mankind. Confronted with a complexity of interests which lead into many diverse fields including physics, optics, economics, engineering, public safety and architecture, the Society's activities are of important concern to many professional groups. They appeal to philanthropic spirit, to humanitarian sense, to economic gain, to commercial prestige, material supremacy, to individual advantage and to scientific advancement.

The breadth of this appeal reflects the general gain in lighting consciousness and interest, a large measure of which may be attributed to thirty five years of educational effort by the Society, together with the correlated activities which it has inspired under other auspices.

Generally, our four-square program includes:

1. Coordinated research and investigation.
2. Developing standards and codes of practice.
3. Education, training and public information.
4. Cooperation and exchange of experience.

These advances in lighting practice have stimulated improvements in light sources and luminaires to the end that the American people have more light and better lighting in the home, school, office, store, factory and on the streets and highways. Seeing is being improved, eyesight is being conserved and added energies are being made available for use in defense.

The Convention offers to the lighting engineers of the United States and Canada and to the electrical industry of the Southeast an opportunity for bringing to bear the technical knowledge and experience of the past to the important problems of today.

Dramatizing Sales Appeals Increases Lighting Sales

By P. M. Rutherford, Jr.*

Regional Vice President
Illuminating Engineering Society

THERE is a definite need today for new thinking, new ideas in the art of selling lighting. Our techniques today are of necessity different from those employed ten years ago, but it is doubtful if we have kept pace, in our methods of selling lighting, with the improvements which the business world around us—our competition—have made in selling their products.

Today we hear a great deal about "Showmanship"—dramatization. Perhaps these words express best the trends of the times in all selling—literally drawing pictures of what we are selling for our prospects. Anything to make our product attractive, largely from the visual standpoint.

Showmanship is not new to lighting. We have been employ-

*Mr. Rutherford is assistant general sales manager for Dallas Power and Light Company, Dallas, Texas.

ing the dramatization of the demonstration for many years. But that is no longer showmanship! The demonstration as it has been done is not new and, therefore, no longer compelling to our prospects. Showmanship does not always mean something spectacular. It may be something simple. After all, it is nothing more than the art of attracting, and holding, our prospects' attention and interest.

To do this we must, first of all, find something in the lighting we wish to sell that will be of particular interest to our prospect. As Kenneth M. Goode and M. Zenn Kaufman say in their book entitled, "Showmanship in Business" (Harper Bros., 1936):

> "Showmanship implies an accurate appreciation of the other man's interest; and as a consequence, placing one's own presentation in a skillfully colored adaptation to, or portrayal of, the other fellow's sense of values."

Our sales presentations must be made around the benefits which our prospect will derive from the use of lighting after he has bought it. In some cases these benefits may be difficult to define but usually there is a definite gain which will accrue to the buyer of better lighting. This is especially true in the case of the commercial business or the manufacturing plant. There the profit motive is uppermost in the minds of our prospects and our lighting will be acceptable if it contributes to these overall business or industrial objectives.

Following is a tabulation of some of the fundamental sales appeals around which we may build our lighting sales presentations to commercial and residential customers. A similar group of appeals might be worked out for selling lighting to a manufacturing plant.

Sales presentations for residential and commercial prospects should be built around the fundamental sales appeals.

Commercial Sales Appeals

Increases Sales and Profits

Makes seeing easier
Enables customers to judge better the quality of product or service
Facilitates transactions
Increases the number of customers and sales per customer
Results in better customer satisfaction
Reduces goods returned for exchange or credit
Reduces shrinkage of inventory due to goods and materials becoming shopworn from handling
Lessens errors by employees in serving customers and packing and shipping materials
Protects customers, employes and business alike from accidents and theft
Enhances safety of customers and employes as well as property
Reduces insurance expense
Builds business reputation and prestige
Aids in keeping facilities modern and in rendering superior service to customers
Pleases and holds present customers and attracts new ones
Improves customer relations and enhances profits

Is Good Advertising

Assures attracting favorable attention to window and store displays
Brings out true quality, color, texture and value of product or merchandise
Provides opportunity for tying in point-of-sale advertising with that in newspapers and other media
Keeps establishment's name before public through electrical advertising service
Is one of the best sales aids available to retailers
Is an essential factor in good operation of all types of commercial establishments

Improves Employe Relations and Employe Efficiency

Reduces eyestrain and nervous fatigue
Decreases frequency of headaches with attendant irritability on part of employes
Contributes to general health
Stimulates employe alertness and attendance to needs and desires of customers
Causes employes to be more careful in personal appearance
Improves working conditions and generally aids in the creation and maintenance of a pleasing "atmosphere"

Is Flexible and Cheap

Can be used for a wide variety of purposes, in many different forms and in many different intensities
Is easily adapted to new or different decorative schemes
Contributes materially to the successful operation of most commercial establishments
Is high in value and low in cost
Is cheap

Residential Sales Appeals:

Makes for Better Seeing

Facilitates reading, studying and sewing
Prevents drowsiness
Allows freer movement in room
Banishes fear of darkness and of prowlers
Makes possible night use of porches and lawns for reading, resting and playing of games

Is an Aid to Health

Reduces eyestrain and conserves nervous energy
Reduces severity and frequency of headaches and other symptoms of eyestrain

Adds to Charm and Beauty

Aids in achieving more natural makeup, thus enhancing personal appearance
Makes shaving more pleasant
Helps beautify home and exhibits good taste in housekeeping
Shows house furnishings in true colors, eliminates harsh shadows
Serves to focus attention on objects of interest
Can be made to harmonize with any scheme of decoration
Brings pride of ownership through addition of style and comfort.

Is Convenient

Easy to turn on and off
Readily available anywhere in the house, workshop, garage, driveway or on the lawn
Lends itself to automatic control where desirable

Provides Safety and Protection

Affords protection against prowlers
Reduces fire hazards
Helps prevent accidents to person or property
Helps keep children at home and off streets

Is Cheap

Costs little
Costs less with increased use
Saves money by making help more efficient
Helps avoid expense for medical attention and eyeglasses
Reduces possibility of expense from accidental injury to person or property
Lessens the chance of loss from theft
Adds value to the home by keeping it modern

The competition among various types of business interests for a portion of the consumer's dollar is becoming more intensive and skillful each day. Few can offer as much for the money as we do, with the many advantages and benefits that result from the use of

(*Continued on page 45*)

Today's Opportunities for Increased Lighting Sales

Greater use can be made advantageously of the several fundamental tools now available for lighting sales promotion.

By Roy A. Palmer*
Regional Vice President
Illuminating Engineering Society

THERE are few industries which can boast of the changes and progress experienced by the lighting industry over the last ten to twenty years. Some twenty years ago, the RLM dome reflector revolutionized lighting in industrial plants. Then came constant improvement in the construction and manufacture of incandescent lamps which brought greater efficiency and lower cost. The Better Light-Better Sight program, evolved from the "Science of Seeing," gave a tremendous impetus to the acceptance of better lighting on the part of the public. The program was greatly bolstered by the coincident advent of the light meter which permitted prospects to appraise their illumination from the standpoint of quantity.

In 1939 the New York and San Francisco World's Fairs were adorned with night beauty—the magnitude and artisticness of which had never been achieved before. It was at these Fairs that the public got its first glimpse of fluorescent lighting. Almost before the manufacturers were ready to place fluorescent lamps on the market, the Fairs were resplendent with these epoch-making light sources. Here was new beauty in both color and linear form. Since then, a little over two years ago, fluorescent lighting has spread like wild-fire through the country in stores, factories and offices.

What next? And with that abbreviated question one may wonder whether or not the defense program might retard lighting progress with its restricted supply of materials. New lighting equipment, radical changes in design of present fixtures and new devices that are related to lighting may be fewer in number in the months to come, but that merely gives us an opportunity to catch up on lighting practice with the tools which we have available now. Actually, lighting practice is quite far behind lighting knowledge and development.

Through all the ages, man has been seeking more light. Not until electric lighting appeared, has there been an opportunity to provide really satisfactory artificial lighting. While some of us think that we are moving along at a slow pace, it is heartening to recall that more progress has been made in the last sixty years than had been made in all of the previous centuries. Our highly satisfactory light sources, which can be owned and operated at low cost, can now compete with daylight as well as darkness.

To make progress, we must be broad in our viewpoints. A lighting fixture salesman cannot do the best job for his prospects and himself if he is selling only a fixture. His prospect will buy with less sales resistance if he tries to sell him the illumination results which that fixture will produce. The real reason a customer buys lighting equipment is to utilize the illumination produced by that equipment.

The light meter is one of our most valuable tools for selling lighting. Because it has been available for many years, some perhaps think it is passe. On the contrary, it is just as valuable today as it was several years ago if we will only use it. Because it can reveal the fact that there is not sufficient illumination on a working or selling area, it becomes a most useful tool to develop prospects.

Footcandles are important but we must always keep in mind that to have good lighting, we must also have *low brightness*. Overlooking this essential feature has often caused dissatisfied customers which only serves to retard lighting progress. The art of controlling brightness is one of the most important keys to higher levels of illumination. With low brightness, we could provide illumination levels on the order of 500 to 1,000 footcandles. There is no such thing as too much light. But there definitely is such a thing as too high brightness-glare which hinders vision instead of aiding it.

The brightness meter can be of great help in selling a lighting system. With it, we can check the brightness of the fixtures, ceilings, walls and working surfaces. Nine out of ten prospects won't be particularily interested in this meter because it may be too technical for them. But one who is selling lighting ought to be familiar with it so that he can sell his prospect a job that is comfortable.

Perhaps a lighting engineer may have to help out in the use of the brightness meter. After a little

(*Continued on page 46*)

What Lighting Customers Need

Higher levels of illumination
Better quality of lighting
Proper distribution of light
Lower brightness
Flexible, economical colored light
Lighting education

Tools for Selling Lighting

Footcandle meter
Visibility meter
Brightness meter
Footcandle selectometer
Science of seeing
Fluorescent lamp

*Mr. Palmer is merchandising and advertising manager for Duke Power Company, Charlotte, N. C.

Leaves from a Notebook on
FLUORESCENT LIGHTING

By O. P. Cleaver

Commercial Engineering Dept.
Westinghouse Electric & Mfg. Co.
Bloomfield, N. J.

THE BOUNDS of reason are a little over-extended, I am afraid, when I glance at some of the applications of fluorescent lighting, especially in the smaller shops and restaurants. Bare lamps, lop-sided fixtures, twilight levels, shadows galore are not only out of bounds, but off sides as well. Reason, as applied to fluorescent lighting applications, may often be down but she isn't out of the game by a long shot, for the trend toward better lighting in the larger installations is a definite triumph for reasonableness in design, and the smaller installations will soon follow suit with a little help from the lighting industry.

Trends in application give the engineer renewed faith in the good judgment of the seeing public.

It's no longer hard to find 50 footcandles in factories, offices, stores, and public buildings. (See Fig. 1). Only yesterday, I visited a drafting room with 100 maintained footcandles of *comfortable* lighting. What used to be a "thrill in a lifetime" of the engineer is now a commonplace customer demand. Customers demand high levels—it's up to us!

Fixtures end to end, sunk out of sight or attached to ceilings, are a normal development in keeping with the physical character of the fluorescent lamp. These lines may run parallel or may form concentric squares or rectangles on the ceiling; they appear in factories, in offices, in stores; and their popularity attests to the unreasonableness of bunching lamps in small spaces where filament lamps would be more appropriate. (See Fig. 2.)

The fluorescent and the filament lamp are not antagonistic, "spectrally" speaking, and if average precaution is taken to provide adequate mixing of the lighting before reaching the area of utilization, nothing is to be feared from the union of these two.

Modern factories today are installing general lighting of 45 or more footcandles which has eliminated the need for supplementary lighting except on machines where exceptional detail discrimination and inspection are factors. The dangers of this trend are evident unless general lighting is kept high—and well above former standard practices where supplementary lighting was an absolute necessity to provide adequate seeing for even the most commonplace manufacturing processes. (See Fig. 3.)

Mounting heights of 20 and 30 feet for fluorescent lamps are not unusual in large, unobstructed areas where utilization factors are high. The lower brightness of the fluorescent lamp is a decided advantage, and its well-known diffusion of the light is now handicapped in these areas where walls are several hundred feet apart. (See Fig. 4)

The shielding trend is so apparent that a glance at the first ten or more installations that you encounter will convince you of it. New prismatic lenses designed for the fluorescent lamp, new glass, new plastic, and new louver de-

INSTRUCTIONS:
SELECT TYPE OF FIXTURE - THEN DIVIDE TOTAL AREA OF SPACE TO BE LIGHTED BY NUMBER IN FIXTURE COLUMN OPPOSITE DESIRED FOOT CANDLE LEVEL TO OBTAIN TOTAL NUMBER OF FIXTURES REQUIRED.

• FLUORESCENT • FIXTURE • SELECTOR

ROOM PROPORTIONS	FT. CDLS DESIRED	9% ↑ 65% ↓ 1-40 WATT LAMP	50% ↑ 20% ↓ 4-40 WATT LAMPS	20% ↑ 55% ↓ 1-30 WATT LAMP 2-40 WATT LAMPS	0% ↑ 79% ↓ 2-40-WATT LAMPS	0% ↑ 80% ↓ 2-40-WATT LAMPS	0% ↑ 78% ↓ 2-40 WATT LAMPS
		AREA PER FIXTURE					
WIDTH IS 1½ TIMES HEIGHT	40	23	68	53	55	62	64
	50	18	54	42	44	50	51
	60	15	45	35	37	42	43
WIDTH IS TWICE HEIGHT	40	21	59	42	49	55	57
	50	15	47	34	39	44	46
	60	12	43	28	33	37	38
WIDTH EQUALS HEIGHT	40	14	44	37	39	44	45
	50	11	35	29	31	36	36
	60	9	29	24	26	29	30

Table 1—This chart provides a simplified method of estimating quickly the approximate number of fixtures necessary to provide 40, 50 or 60 footcandles in rooms of various proportions.

signs have all appeared recently to relieve the pressure created by this trend.

The 3500° White lamp already accounts for more than 60 per cent of all colors sold, with Daylight trailing a poor second and losing ground. The Soft White has not as yet reached its stride, but it is not expected even then to give the 3500° lamp much of a race.

* * *

Designing fluorescent lighting should not be taken too lightly—it may look a cinch, but the rule of thumb technique and experience are not sufficient; good engineering background training is an absolute requirement.

Fortunately, there are numerous books, booklets, and pamphlets available from various sources which will help any intelligent person with a fair amount of experience in lighting to develop the technical background which should support any design work.

Table 1 can be of help to you, provided you use it as it was intended to be used—only to enable you to make a quick estimate of the number of fixtures required to produce a given footcandle level. This kind of information is helpful in beginning a sales negotiation and in cost analysis. But when you submit the final design, do it in an engineering manner and only after a complete engineering survey.

The easiest way is not always the best way—even in lighting.

* * *

Fixtures: certified, pedigreed, or just "common dog" variety. "There sho is 'nough of 'em," so said the old colored man when he visited one of the Fluorescent Futuramas displayed in several cities this spring.

Why can't more of them be just plain, functional instruments to support the lamps and their auxiliaries, with adequate plastic or glass shielding to make them more eye comfortable?

Why do we always have to go through the three "istic" stages in design, before waking up to the fact that there is no substitute for simplicity and good lines? Cubistic, futuristic, and modernistic decorations on anything went out of style with the stock market—let's don't revive them on fluorescent fixtures now. Some manufacturers have.

My idea of a good fixture is one that would meet all the following specifications 100 per cent:

a. Proper light distribution (determined by requirements of installation)
b. High efficiency—a relative value depending on the lighting results to be achieved.
c. High power factor—no exceptions to this.
d. Low brightness in vision field—adequate shielding required.
e. High appearance rating lighted and unlighted—no "istic" decorations.
f. Electrical and mechanical ruggedness.
g. Ready access to lamps, starters and ballasts—no acrobatic maintenance men available.
h. Cost—low for the value received.
i. Lamps per fixture restrained in number—more fixtures, more continuous mountings.

* * *

Thoughts on voltage—guaranteed not to shock, unless, of course, you still think fluorescent lamps act like filament lamps under the same conditions of voltage. Well, they don't. Lower than rated voltage causes filament lamps to burn **longer** and inefficiently. Lower than rated voltage causes

Fig. 1. (Bottom) Coves above wall cases and individual lighting in all showcases, combine with well-louvered troffers in the ceiling to make this small clothing store a model of well-designed high level lighting for selling! White fluorescent lamps are used in various sizes to give above 50 footcandles of general illumination throughout the sales area.

Fig. 2. (Top) High level illumination from continuous lines of light is featured in this modern woolen mill. Forty-watt white fluorescent lamps in continuous troughs sunk in ceilings of accoustical material provide over 40 footcandles of general lighting. This advanced design is indicative of the general trend in industrial illumination today.

fluorescent lamps to **burn out** quicker—and operate less efficiently. It's true that light output is less affected by variations from rated voltage in fluorescent than in filament lamps—about 2 per cent loss in lumens for every 1 per cent drop in voltage. (Fig. 5.)

It is equally true that fluorescent lamps cannot be dimmed—and that a reduction of as much as 30 per cent in line voltage will cause them to black out completely! Beware of those combinations of power and light circuits in some factories where voltage surges do occur frequently. Fortunately, in such cases, the fluorescent lamp does come on immediately (with usual starting time required, of course) after the outage, unlike the high intensity mercury vapor lamps.

What about over-voltage? Avoid it, also, for greater than rated voltage greatly shortens the fluorescent lamp life, hastens end blackening, and results in only modest increases in lumen output.

P. S.—The color of the light will be practically unchanged regardless of voltage variations—something that cannot be said about filament lamps, you know.

* * *

Thoughts on wiring—something all of us should think about more often, now that the National Electrical Code has been changed and thin insulation is at last recognized—with proper restraint, of course. The high efficiency of the fluorescent lamp, combined with Code permission to use thin insulation wire for re-wiring old buildings, permits the electrical contractor to double lighting levels without conduit changes—it's a good market that needs only a little encouraging development.

The laws against excessive voltage drop in circuits from panel boards to lamps are still in force—believe me. Fluorescent lamps flourish only on rated voltage—give it to them, or else they flicker, blacken, live only a short time—and then precariously. The old rule—nothing over 2 volts drop in any branch circuit—is a good rule in this modern age of fluorescence. Several feet of wire—50 feet is a good limit—is permissible between ballasts and sockets, but the shorter the distance the better because of possible voltage drop in leads and—don't forget the likelihood that radio interference might be increased.

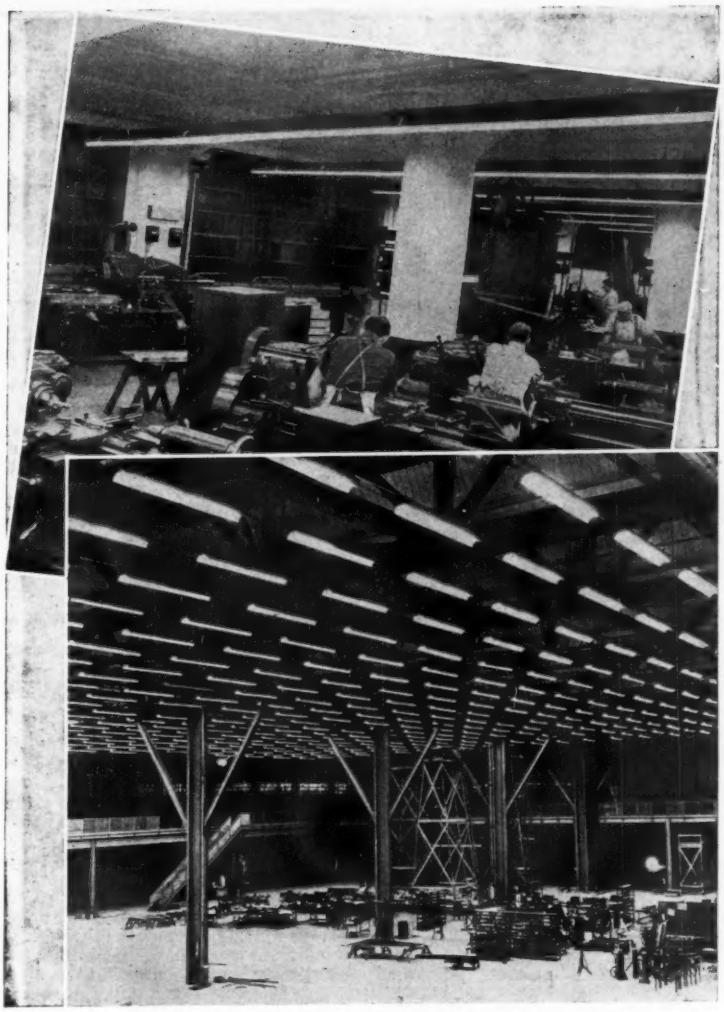


Fig. 3. (Top) The trend to higher levels of general illumination for factories has made individual machine lighting unnecessary except where exacting visual efforts are required of operators. This small machine shop with its 45 footcandles of general illumination from continuous troughs containing two rows of 40-watt white fluorescent lamps is indicative of the modern trend.

Fig. 4. (Bottom) New defense factories, with ceilings over 30 feet high and unobstructed floor spaces of thousands of square feet, have demonstrated that fluorescent lamps in well-designed industrial reflectors can be mounted at these heights and provide efficient, well-diffused illumination on the working plane many feet below. Vertical illuminations are exceptionally good under these conditions.

Table 2 is a convenient way to determine how many fluorescent lamps the Code will permit on various sizes of rubber insulated wire but remember this does not take into consideration our two volt drop limitation. Determine the number of lamps based on this objective after you know the circuit run in your installation. Fluorescent lamps also have a way of drawing as much as double rated current momentarily at starting. This may cause fuse and circuit breaker trouble if this characteristic is ignored in your wiring design.

Don't overlook that 208 and 240 volt systems offer material advantages in fluorescent lighting. The life and efficiency of the lamp is unaffected and economies in wiring and ballast expenditures can be effected.

Three-phase wiring systems (see Fig 6 and 7 for connection diagrams) can also be used to good advantage to reduce flicker, but of course, two-lamp ballasts can accomplish about the same results

Table 2—Wiring Table for Fluorescent Lamps

Lamp Size and Ballast Type	Ballast Watts	Line Amps	No. 14 Wire (15 Amp) Max. No. Lamps Allowed**	No. 14 Wire (15 Amp) Max. No. Lamps 2% Drop***	No. 12 Wire (20 Amps) Max. No. Lamps Allowed**	No. 12 Wire (20 Amps) Max. No. Lamps 2% Drop***	No. 10 Wire (25 Amp) Max. No. Lamps Allowed**	No. 10 Wire (25 Amp) Max. No. Lamps 2% Drop***
H.P.*—Single Ballast								
15 watt	4.5	.18	83	46	110	74	139	121
20 watt	4.5	.23	65	36	87	58	108	94
30 watt	10.0	.37	40	22	54	36	68	59
40 watt	13.0	.50	30	17	40	27	50	42
Two-Lamp Ballast								
15 watt	9	.35	86	48	114	76	142	120
20 watt	9	.43	70	40	94	62	116	100
30 watt	14.5	.66	46	26	60	40	76	64
40 watt	17.5	.86	34	20	46	32	58	48
100 watt	35.0	2.05	14	8	20	14	24	20

* —High Power Factor ** —Based on current carrying capacity of wire *** —Based on circuit—one wire length 50 ft.

so far as the eye is concerned. The flicker present in a fluorescent lamp won't harm the eyes physically in any way—although it may be annoying mentally when associated with moving objects.

* * *

Sooner or later power factor rears its ugly head. The one way to solve the power factor problem is to tell a customer what high power factor will do for him—and stop trying to explain what it is in simple terms which are always confusing. Power factor just can't be explained in simple terms.

"Why should I buy high power factor equipment?" is frequently asked. Here are a few reasons that a customer can understand:

Because—when power factor is low, as in the case of an uncorrected fluorescent lamp circuit, extra current is present (almost twice as much as in corrected circuits) which does no useful work so far as the lamp is concerned and merely circulates through your wiring system, over-taxing its capacity and causing it to heat up.

Because—you pay for this heat since it is registered on your meter as kilowatt hours. Of course, some heat is caused by normal current loads in high power factor circuits, but on low power factor fluorescent circuits this heat

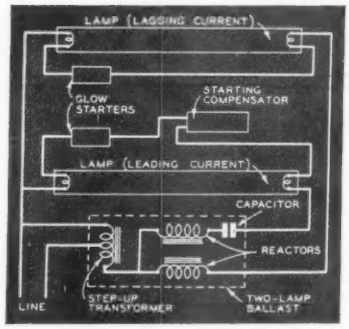


Fig. 6. This diagram shows the connections of a two-lamp ballast and compensator to a single phase supply circuit.

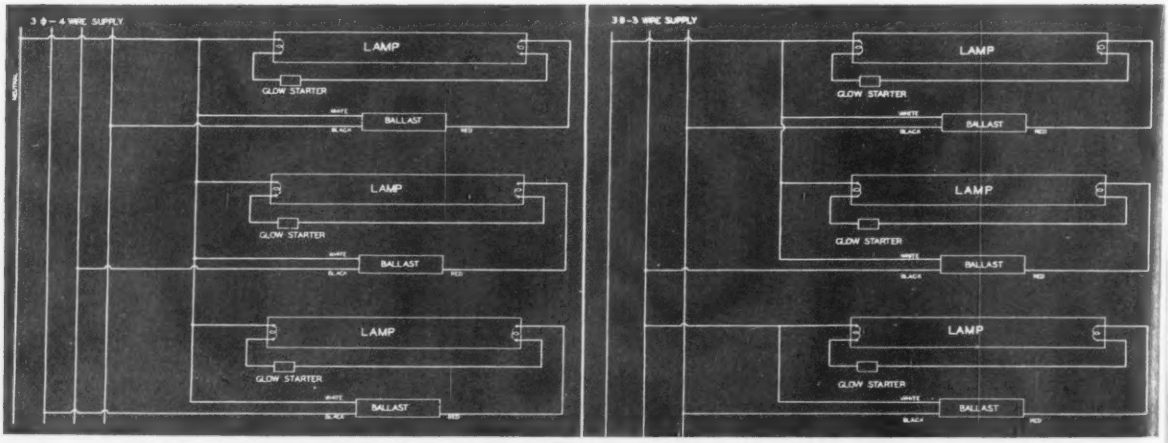


Fig. 7. The diagram at the left illustrates a method of operating three 40-watt Mazda F lamps from a three-phase four-wire supply, using high power factor single lamp ballasts. The connection at the right shows method of connecting to a three-phase, three-wire supply. These connections and that shown in Fig. 6 all reduce stroboscopic effect.

is **four** times greater, for it varies as the square of the current in that circuit. So you, Mr. Customer, will have higher light bills with low power factor circuits.

Because—voltage drops in individual fluorescent circuits are reduced approximately 50 per cent and this may mean better lamp life and quicker starting—a real saving.

Because—for a given number of lamps on a circuit, you can use about half the wiring capacity and get good performance. This means less wiring expense, and wire can be expensive.

Because—many states have so-called "power factor laws" which require all circuits of a given wattage or above to be corrected to power factors above 85 per cent—and in some above 90 per cent; otherwise, an extra charge will be made each month on your bill. Another saving!

Because—finally, for the 40-watt lamp (most commonly used today) the two-lamp ballast, whereby two lamps may be operated from a single unit, automatically corrects for power factor and actually costs less than two single lamp ballasts.

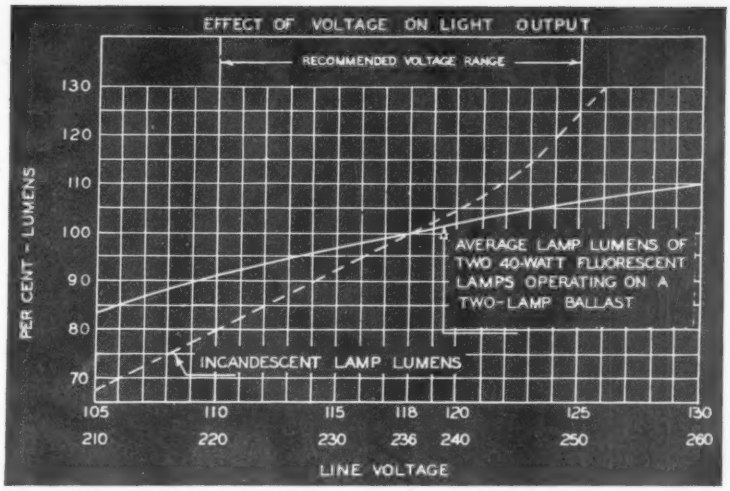


Fig. 5. The effect of voltage on light output of fluorescent lamps as compared with incandescent lamps.

Table 3—Comparative Cost Analysis of Fluorescent and Incandescent Lighting Installation

Specifications:	Fluorescent	Incandescent
a. Type of fixture	RLM 2 40-W	RLM
b. Number of fixtures	146	64
c. Fixture wattage	100 (Incl. Aux.)	500
d. Coef. of utilization	65%	65%
e. Maintained ft.-c.	40	40
f. Annual operating hours*	5000	5000
Fixed Charges:		
1. Cost of fixtures*	$2700.00	$255.00
2. Wiring cost	730.00	320.00
3. Complete installation cost (1, 2)	3430.00	575.00
(A) Fixed annual charge on investment in equipment, (interest, taxes, insurance, amortization, 17%)	584.00	98.00
Operating Charges:		
1. Lamp cost		
a. Total number of lamps	292	64
b. Lamp life (hours)	2500	1000
c. No. of lamp renewals (a.) x operating hours / lamp life	585	320
d. Lamp cost (list less discount of 30%)	$1.12	$ .84
(B) Total annual lamp cost (c x d)	$655.00	$269.00
2. Energy cost		
a. Total watts	14,600	3200
b. Annual KWH	73,000	160000
(C) Total annual energy cost at 1½c per KWH*	$1095.00	$2400.00
Total Annual Operating Cost (Sum of A, B and C)	$2334.00	$2767.00

***Note: Items marked with an asterisk (*) have an important bearing on the final result. Determine these factors carefully!**

Perhaps power factor is not such a problem after all—manufacturers of ballasts report that over 80 per cent of all sold are of the high power factor type. The American public still knows a good thing when they see it, apparently.

* * *

Ballasts and starters are the real watch dogs of your fluorescent lighting. First, starters—they are rather delicate and shouldn't be banged around. Treat them gently and they will treat your lamps likewise for a long time. Don't make them do overtime work—when you see the little fellow working away trying to start a lamp that refused to start (see next section)—remove the lamp pronto; not only will the starter suffer—so will the ballast. It pays to be kind to dumb starters.

Ballasts, next—don't pust them around too much, if you expect good service. Take hum, for instance—give them a cushion on which to sit in your fixture or coves and make sure they sit there permanently. Vibration absorbing washers or asbestos pads are "right" for cushions, and lock washers and nuts are insurance that they will

(Continued on page 44)

LIGHTING for INDUSTRY

Current trends in industrial lighting practice are reviewed in this comprehensive article discussing light sources, quality, equipment, methods, and maintenance.

By Willard C. Brown
Illuminating Engineer
General Electric Company
Cleveland, Ohio

IN THIS period of national emergency, the lighting fraternity has a real opportunity to be of great service to industry. That opportunity lies in the fact that eyes require light and the more and better the lighting, the more quickly, accurately and safely work can be done.

The ability to see depends largely upon the presence of positive illumination or footcandles of proper quality on the task and the absence of negative light or glare in the eyes. Within practical limits, the more "positive" light there is, the better one sees and the more "negative" light there is, the less one sees and the less one produces. One important task of the lighting man is to see that there are plenty of positive footcandles provided to help industry get the production which is so needed today.

Footcandle Values

Tables of recommended footcandle values (I. E. S. Recommended Practice of Industrial Lighting —I. E. S., 51 Madison Avenue, N. Y. C.) have served in the past as an acceptable guide and such tables have great practical advantage. However, as we begin to appreciate the significance and implications of lighting in the broader sense, we realize the need for fitting the lighting definitely to each specific seeing task. This philosophy has been the basis for extensive researches conducted by the Lighting Practice Committee of the Illuminating Engineering Society. This committee already has undertaken a study of the lighting requirements in eleven basic industries and in each of the completed studies (eight are now complete) it has been found that by providing the proper quantity and quality of lighting, the ease and accuracy of production has been increased.

In recent years the research laboratories have developed many important facts relating lighting to the human processes of seeing, showing that with better lighting there are many advantages, not only in the discernment of fine detail and in the speed of seeing, but also human benefits such as lessened nervous energy — translatable into less tiredness toward the end of a shift.

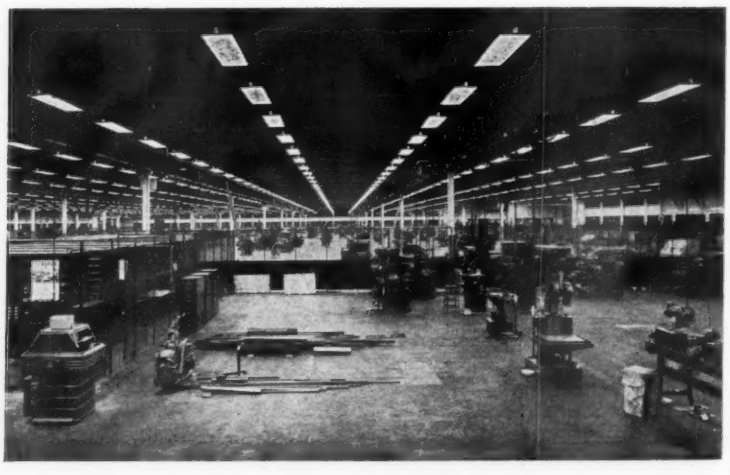
Industrial executives are appreciating these new findings and facts. In our defense industries precision and speed are vital and in the design of these mammoth plants, lighting is being regarded as a principal means toward these ends. In the industries where seeing tasks are critical, general lighting of 30 to 50 footcandles maintained in service (not just when the system is new and fresh and clean) is the accepted thing.

Quality of Light

In lighting, as in most things, good quality is all important if good seeing conditions are to be obtained and the workmen be enabled to perform their tasks efficiently. Actual experiments have established the fact that the quality of the lighting is every bit as important from a seeing standpoint as is the quantity, and that poor quality of lighting can produce effects as deleterious as those associated with too little light.

For example, a glaring source located 20 degrees from the line of vision and providing 5 footcandles at the eyes and 5 footcandles at the task produced the same degree of muscular tension as was produced when performing that same task lighted to only one footcandle but with no glare present. This sort of thing is negative light with a vengeance.

Many industrial operations involve seeing fine detail on plain and curved specular surfaces such as scales, micrometers, dials, etc., and the lighting of such tasks requires careful consideration to insure good results. For example, the I. E. S. study on "Lighting for the Machining of Small Metal Parts" stated that highest visibility is obtained, for such a task, involving the reading of dark lines on polished surfaces, by using a



Kelsey-Hayes Wheel Company, Plymouth, Michigan, have installed two-lamp fluorescent units with 100-watt white Mazda F lamps on 10 foot by 13 foot centers and are receiving 35 footcandles in service.

source of large-area and low-brightness. The specular reflection of such a source on the surface of the dial or scale should be of sufficient width to form a uniformly bright background so that the figures, divisions, marks, etc., are readily seen. Where the relatively small filament lamp direct-type industrial units are employed, the reflection of the source is a rather narrow brilliant band which may actually obscure the figures because of the harsh reflection.

New Light Sources

It has been many years since the lighting industry has been presented with a new light source which actually deserves to be called revolutionary. The new Mazda fluorescent lamps, however, fairly rate this designation and industry is literally installing them by the mile. There are several reasons why the lamps have gained instantaneous acceptance.

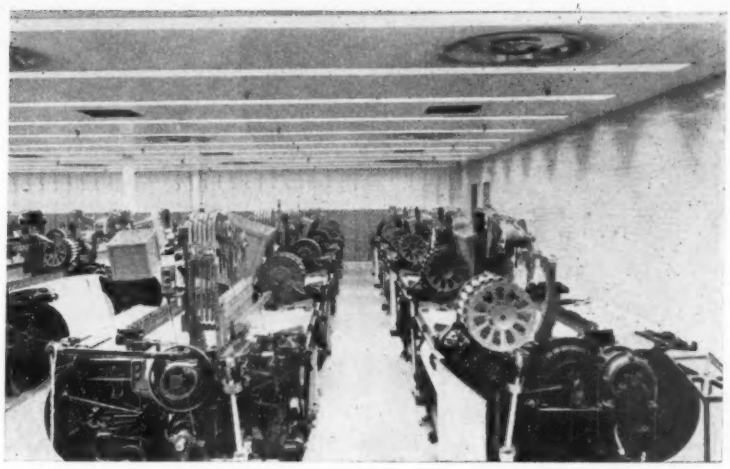
REASON 1: *They produce light of daylight color quality economically.*

An abundance of indoor illumination with the color quality of natural daylight has long appealed to men as the last word in artificial lighting. The blue-colored incandescent lamp bulbs and the various blue glass filters have supplied a good approach for many years, but at a sacrifice of one-third to three-fourths or more in illuminating efficiency as compared with ordinary lamps. With high levels of illumination, the extra energy consumption meant just that much more heat.

Almost overnight, when the fluorescent lamp made daylight available in abundance, its use spread like wildfire. Much experimental work has been done with the Mazda F daylight lamps on a wide variety of work involving color discrimination, and they are proving satisfactory in many cases.

After three years of availability, the daylight lamp continues as a good bet from all standpoints. It may have lost some of the first impetus, due to the somewhat higher efficiency of the present Mazda F white lamp, but the big point is —when industry wants daylight, it can have daylight.

REASON 2: *They produce cooler illumination.*



This truly modern air conditioned weave room of Macon Textiles, Inc., Macon, Ga., is lighted with 40-watt white Mazda F lamps in "troffers" spaced 5⅓ feet apart. There were 60 footcandles measured when the installation was new.

For a long time the fur cold storage people seemed to have a monopoly on the use of icicles in advertising. Then came the theatres and stores with their air cooling systems. And finally, the lighting equipment people; their catalogues now advertise "cool footcandles."

In an incandescent lamp, some 8 to 10 per cent of the energy goes into light, whereas in the fluorescent lamp, there is nearly 20 per cent. As for the balance, the incandescent lamp radiates 65 per cent in heat and the fluorescent lamp only 30 per cent. So maybe the icicles aren't such a bad idea. Certainly the lamps can provide several hundred footcandles of illumination without the discomfort from radiant heat formerly associated with high footcandles. And they are being used as supplementary sources, close to the workmen, to do just that.

REASON 3: *They are large-area low-brightness sources and hence provide lighting of good quality.*

In a 100-watt inside-frosted filament lamp, 1650 lumens of light are given off by a 2-inch circle of brightness comprising 3½ square inches. In a 40-watt Mazda F daylight lamp, 1800 lumens are given off over something like 70 square inches. This means two things: (1) fixture parts which reflect diffused images of the lamp are not excessively bright and (2) the light comes from such an extended source that the lighting is soft and free from harsh shadows.

Artificial daylight floods this defense plant. There are 60 footcandles provided by the 40-watt daylight Mazda F lamps in continuous-row RLM units, spaced 7½ feet apart and mounted 10 feet above the floor.

W. C. Brown Named President of I.E.S.

Willard C. Brown, executive engineer of the Nela Park Engineering Department, of General Electric Company, at Cleveland, O., and author of the accompanying article, has been elected president of the Illuminating Engineering Society, and will assume office October 1. At present, Mr. Brown is in charge of a number of activities of the Nela Park Engineering Department, including industrial lighting, floodlighting, office lighting, school lighting, railroad lighting, hotel lighting, and similar applications.

He first appeared before the Illuminating Engineering Society at the Rochester Convention in 1921, where he presented the first comprehensive paper on "Incandescent Lamp Temperatures as Related to Modern Lighting Practice." He served as chairman of the Committee on Progress for six years. He was vice-chairman of the Committee on Lighting Practice during the period that the Committee produced the American Recommended Practice of School Lighting and the IES Recommended Practice of Industrial Lighting. He has served as a director of the Society and as chairman of its Committee on Finance.

In 1939, he acted as director of the Secretariat on Lighting Practice at the International Commission on Illumination at Scheveningen, Holland, and presented there a paper on industrial lighting in the U.S.A.

Mr. Brown is a special lecturer at Case School of Applied Science. He is in wide demand as a speaker on lighting subjects before a variety of technical groups.

Just because the fluorescent lamps are exceptionally efficient sources and of low-brightness, this does not mean that properly designed reflector equipment can be eliminated. On the contrary, well-designed equipment is highly desirable. Although the fluorescent lamps are not as bright as filament lamps, they are too bright and large to be used bare in most factory applications; suitable shielding is necessary. Also the reflectors, if properly designed, can be cleaned readily; most factory ceilings cannot.

The other new fluorescent lamp, designed especially for industrial lighting, is the 85-watt type RF. It is 58 inches long and operates on the full-wave rectified principle; therefore the stroboscopic effect is almost entirely eliminated. Fixtures are available embodying one or two lamps, which, including the wattage consumed by the auxiliary, are rated at 100 and 200 watts. RF lamps are available in two colors—one a cool blue-white and the other a coolish white termed "industrial white." These blend well with daylight, are psychologically cool and hence agreeable to work under, although they are not recommended for accurate color discrimination. These lamps find their most important application in providing general lighting in low-bay industrial areas, but they are also useful for supplying localized general lighting when the units are suspended relatively close to the work. Lately quantities of them have been used in high bay areas where the seeing task demanded a source of lower brightness than filament or mercury lamps.

The past few years have seen a remarkable acceptance of the 400-watt Type H mercury lamps and no wonder, for when the overall cost of light is figured, it is usually found that light at lowest cost is provided by these mercury lamps. They are most often used for the lighting of high-bay industrial areas but for many types of work they can be very effectively employed at the lower mountings. When equipped with the proper transformer, this type of lamp can be used on either 115 or 230 volt alternating current circuits. The initial efficiency is approximately twice that of comparable wattage filament lamps.

These sources produce a predominance of light at the blue-green end of the spectrum. Filament lamps, on the other hand, are rich in colors at the red end of the spectrum. The two lamps when combined, supplement each other's colors and the result is illumination of a cool, pleasing color that gives the effect of daylight. For the best appearance of colors under this synthetic daylight, equal quantities of light from the Type H lamp and the filament lamps are recommended. If appearance of colors is not im-

Forty-two footcandles are provided in this eastern defense plant by a combination mercury and filament system. One 100-watt filament lamp and 2 Type H 400-watt mercury lamps are employed on an alternate staggered arrangement. The units are spaced 16⅔ feet apart and mounted 44 feet above the floor.

portant, combinations of equal wattage are satisfactory. If there is likely to be occasional interruptions of electric service, or wide fluctuations of voltage, the combined system is particularly satisfactory because it permits work to go on unburdened during the few minutes required for the H lamps to restart after an interruption.

Lighting Equipment and Methods

There is still much confusion in the minds of many consumers as to which light source and what type of equipment should be used. Small wonder either, for it is somewhat of a problem for the lighting specialist to always know what should be recommended, since in many cases there is little to choose between several methods.

The problem is best solved by a study of the seeing task, its nature, the degree of severity, etc. If it is a really tough job then high footcandles of good quality are required and this immediately suggests the use of the Mazda F, the RF or the Type H lamps. These sources can be placed on so-many-foot-centers to give the desired footcandles, or where the F lamps are used, the continuous row method can be applied.

This idea of continuous-rows is fast becoming a new standard for lighting. Miles of it are going into our defense industries. It consists essentially of standard fluorescent industrial reflectors with closed ends to serve as louvers and break up the brightness effect of the long run of lamps when viewed along the row. The reflectors are mounted end to end. An important feature, however, is the continuous channel which runs along above the reflectors. This serves as a closed wiring trough to which power need be brought at only one convenient point along the row. It supports the reflectors, and carries the auxiliaries.

Defense plants such as this Curtiss-Wright airplane factory are installing literally acres of continuous-row lighting. This installation provides approximately 30 footcandles in service with the RLM fluorescent units mounted 22 feet above the floor and spaced 13½ feet apart. Inset is a close-up of a graduated cross-feed micrometer collar showing the excellent visibility which results from such a system.

Continuous-row lighting offers several advantages over the older method of placing individual units on so-many-foot-centers. For example:

(1) The overall cost is low. Cost of installing an individual-unit system ranges from 50 to 80 per cent of the cost of the equipment, and continuous row equipment saves 30 to 50 per cent of this installation cost.

(2) It is easily installed.

(3) Maintenance is simple with quick-detachable reflectors.

(4) It provides a high quality of lighting. For some tasks the visibility is improved as compared with older arrangements.

(5) It is flexible. If the footcandles provided by full rows are not immediately required, every third reflector can be omitted, the channel being closed with a plate. Then later, when more light is needed, the third reflector can be added and the channel and wiring are already there for the auxiliaries and sockets. Further flexibility is achieved by installing reflectors that are punched for a third lamp. When desired, the third lamp and its accessories can then be installed and the illumination increased nearly 50 per cent at relatively small cost.

When the area to be lighted is comparatively narrow and high in proportion to its width, the Type H lamp or the high-wattage incandescent lamps are generally suitable, used in high bay reflectors which direct a maximum of light to the working plane without wasting it on the side walls. Ceiling height alone is not the gov-

(*Continued on page 47*)

The Monarch Machine Tool Company, of Sidney, Ohio, makers of precision equipment, are using the 2-lamp RF units and receiving between 25 and 30 footcandles of good lighting. This type unit operates on the full-wave rectification principle and stroboscopic effect is negligible.

LIGHTING for SELLING

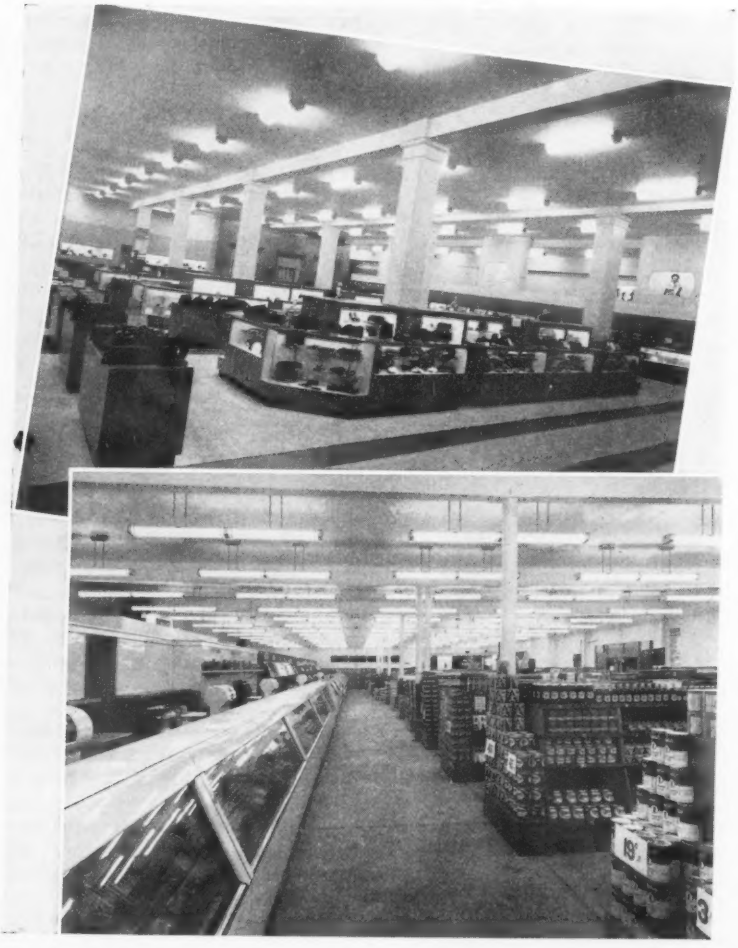
Recent development trends and practices in the application of fluorescent lighting to commercial establishments are discussed here by a well-known illuminating engineer.

By D. P. Caverly

Illuminating Engineer
Hygrade Sylvania Corp.
Salem, Mass.

EMERSON is supposed to have said something to the effect that if a man could preach a better sermon, write a better book, or build a better mousetrap than his neighbor, although he build his house in a wood, the world would make a beaten path to his door.

He may have been right about it at the time he made his observation, but today the well-beaten paths lead to the store whose management lets the world see what it has to sell. Retail merchandising is highly competitive and becomes more so as time goes on. Along with everything else, merchants have discovered—in many cases their competitors have shown them—that so small a factor as doubling the illumination brings an immediate influx of new patrons, increased sales, lowered selling costs, and greater profits.



The installations shown on this and the following page are examples of good practice in the application of fluorescent lamps to commercial establishments. Note particularly the low brightness that results from complete shielding of the lamps. Above, the M. M. Cohn Department Store, Little Rock, Ark., in which 100 Hygrade Miralumes provide approximately 30 footcandles of glareless, shadow-free illumination. The fixtures are surface mounted on 12 foot centers, 12 feet above the floor. Below, The Acme Grocery Co., Akron, Ohio, where 150 units grouped in 75 eight-foot sections provided 75 footcandles of well diffused illumination. The distance between ends of units is four feet and the rows are spaced 8½ feet apart.

Doubling the illumination in the average retail store used to be somewhat of a major operation. Thousands of store owners were ready and willing to spend the necessary money for new lighting equipment with larger incandescent lamps and fully appreciated that the higher operating cost would be a worthwhile investment. They hesitated, however, to close up shop for the few days required to re-wire for the increased load.

A standard two hundred watt frosted incandescent lamp has a rated initial efficiency of 18.5 lumens per watt, or a total lumen output of 3700 lumens. The forty watt fluorescent lamp with a comparable color, designated as "3500° White," has a rated initial efficiency of 52 lumens per watt, or a total lumen output of 2100 lumens. Since the fluorescent auxiliary loss may be considered at about 25 per cent of the lamp wattage, it is obvious that four, forty watt fluorescent lamps plus their auxiliaries will require 200 watts for operation. Such a combination has a total lumen output of 8400 lumens, or approximately two and one-half times as much as the 200 watt incandescent.

Thus it can be seen that efficiency is the primary justification for the use of fluorescent lighting in retail stores.

The second characteristic of importance to merchants is the wide range of remarkable new colors. The Daylight fluorescent lamp is

the closest approach to natural daylight that has ever been achieved with any degree of efficiency. As a matter of fact, the color quality of natural daylight varies so widely with the time of day, weather, season and exposure that a standard daylight color had to be established. This standard is based upon a set of conditions involving skylight without direct sunlight, plus a few scattered clouds, at a certain time of day and year, at one location. It has been "standard daylight" for several years and the Daylight fluorescent lamp was made to match it.

There has been some amount of criticism of the fluorescent daylight color for merchandising areas, most of which is the result of a psychological reaction to a departure from the yellowish incandescent color which we have become used to over a period of years. It is true that some of the warmer colors such as red, orange and yellow lose a little of their brilliance and appear slightly more brown under daylight fluorescent lamps but perhaps no more so than if they were viewed under natural north skylight. On the other hand, the cooler blue and green shades are somewhat enhanced by fluorescent daylight. Thousands of showcases containing merchandise of various colors, such as neckties and similar articles of clothing, have been illuminated with Daylight fluorescent lamps to the complete satisfaction of the store owners. A show window properly illuminated with Daylight lamps is almost sure to compel much more attention because of its distinctive appearance.

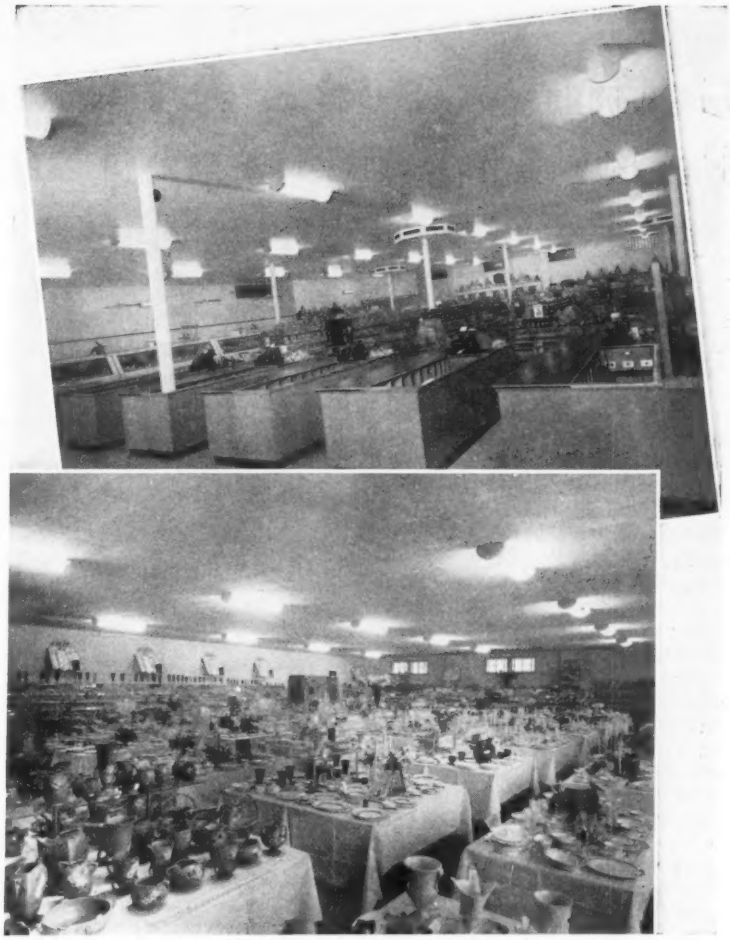
Of course, some degree of common sense should be exercised in the selection of fluorescent color. Articles of daytime outdoor wear, such as hats, coats, shoes, neckties, sportswear or luggage, can almost always be displayed under Daylight fluorescent illumination, whereas evening gowns and accessories can be more effectively displayed under either incandescent or "3500° White" fluorescent lamps—at least until the use of fluorescent lighting becomes more prevalent in the home.

The "3500° White" fluorescent lamp is somewhat nearer the incandescent in color quality and creates, perhaps, a little more warmth of atmosphere wherever it is used. It is the most efficient of the fluorescent family and finds wide application in office, store and other commercial interiors. Certain types of women's shops and departments in the larger stores prefer the "3500° White" since it provides an element of "softness" which is not present when Daylight lamps are used.

The "Soft White" fluorescent lamp is a comparative newcomer. Its development during the past year is due to the fact that in many instances the warmer colors, such as red and pink, appeared to be distorted under Daylight, and to a lesser degree under 3500° White fluorescent lamps. In lobbies, lounges, cafes and similar areas where women congregate, the color quality of Soft White lamps is particularly flattering to complexions and make-up—much more so than incandescent lamps of yellow and ivory tints. Restaurants find them most satisfactory since they tend to improve the appearance of many foods.

As far as the other fluorescent colors are concerned (red, green, blue, pink and gold) there has never been, in the history of artificial illumination, colored light sources with as much life and vitality. The green and blue lamps are particularly brilliant, delivering a great many times the amount of light of incandescent lamps of equal wattage and color. The gold and red lamps are distinctively rich in their respective colors and have a great deal more

(*Continued on page 96*)



Above, the Henke and Pillott Super Market, of Houston, Texas, obtains 25 footcandles of soft, even lighting over its counters from surface mounted units on 14 foot centers, 12 feet above the floor. The Croyden China Company, of Chicago, shown below, makes use of "3500° white" lamps in surface mounted Miralume fixtures to show off to advantage its fine china, glass and pottery. The average illumination on the display tables is 32 footcandles. The fixtures are mounted on 12 foot centers, 10 feet above the floor.

Getting Good Performance From Fluorescent Lamps

By Phelps Meaker

General Electric Company
Nela Park Engineering Dept.
Cleveland, Ohio

FLUORESCENT lamps have a number of features which enable them to be applied effectively in a great many ways. Probably the most important factor in obtaining satisfactory service results from their application in appropriate ways and for such applications as will take the fullest possible advantage of these features. However, an installation laid out in accordance with the best recognized practice will give satisfactory service only if provided with proper accessory equipment, and serviced with an understanding of the correct functioning of these devices.

Since a lighting installation is judged primarily by the illumination result, the first consideration should be that the lamps deliver the rated light output assumed in making the original calculations. At the same time this output should be secured at the highest practical overall efficiency.

Ballast Ratings

Fluorescent lamps operate best at rated current and line voltage. Light output follows in approximate proportion to the voltage. Overall efficiency decreases at higher line voltage. Of primary consequence, therefore, is the maintenance of the supply voltage close to the center of the range for which auxiliaries are designed.

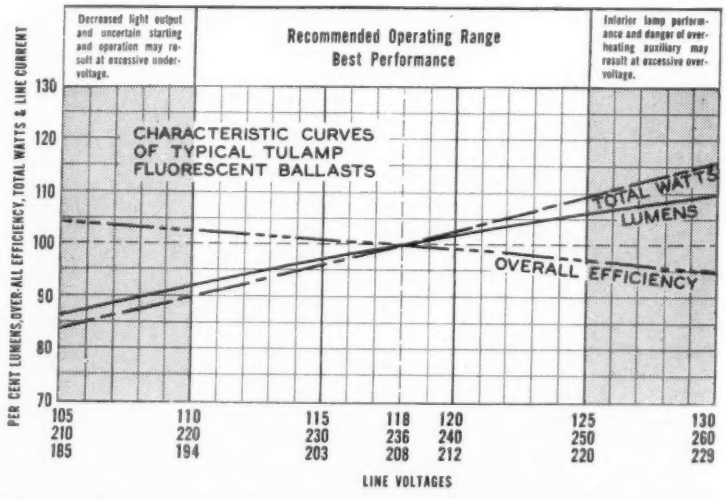
The voltage range on the nameplate of a well-designed ballast means that throughout this spread of voltage the wattage consumed will be within approximately 10% of the nominal rating. This ability to maintain fairly constant lamp wattage over a varying voltage range is known as regulation and is about the best index of quality in the ballast equipment. In a Tulamp ballast, which consists of a leading power factor branch and a lagging power factor branch, the leading lamp branch tends inherently to maintain even regulation, but being the more complex circuit, it is more likely to be a trifle off rating at the center of the range.

In regulating the wattage to the lamp, the ballast consumes some power itself in the form of internal losses. Minimizing these losses makes for higher overall efficiency of the installation in terms of lumens generated per watt consumed. Since ballast loss all goes into heat, care must be exercised in the mounting and ventilating of ballasts. Not only must the installation be free from hazard due to overheating, but the ballast itself must be protected from injury by excessive temperature.

Lighting equipment incorporating accessory devices to give good performance is generally available. Recommended ballast equipment carries labelling indicating conformance with specifications under Electrical Testing Laboratories tests and Underwriters' Laboratories requirements.

Unlike filament lamps, fluorescent lamps are quite sensitive to surrounding temperature as regards light output. For each basic type of lamp there is a certain bulb operating temperature at which maximum efficiency of light production is assured. The ultraviolet energy generated by the mercury arc discharge within the lamp is concentrated in the range which produces most fluorescence and visible light. The effects of high or low temperature upon light output result from the shifting of the point of energy concentration to less effective regions. Standardized light output ratings are made with a free circulation of air about the lamps, but without drafts.

The bulb temperature reached by lamps of 40 watts or less operating in open air corresponds approximately to the optimum condition. Low bulb temperatures, due to cold weather or cold drafts, materially lower the light output. Where fluorescent lamps are to be operated in low temperature surroundings, better light output will be obtained if they are enclosed or provided with some sort of transparent sleeve to conserve the bulb heat. Higher tempera-


Decreased light output and uncertain starting and operation may result at excessive undervoltage.
Recommended Operating Range
Best Performance
Inferior lamp performance and danger of overheating auxiliary may result at excessive overvoltage.
CHARACTERISTIC CURVES OF TYPICAL TULAMP FLUORESCENT BALLASTS
TOTAL WATTS
LUMENS
OVERALL EFFICIENCY
PER CENT LUMENS, OVERALL EFFICIENCY, TOTAL WATTS & LINE CURRENT
130
120
110
100
90
80
70
105 110 115 118 120 125 130
210 220 230 236 240 250 260
185 194 203 208 212 220 229
LINE VOLTAGES

Fluorescent lamps operate best at rated current and line voltage. This chart indicates how lumens, watts and overall efficiency vary with variations in line voltages. The line labelled "Total Watts" represents the consumption of both lamps plus the ballast losses. At 124 volts, the total watts value of 108% includes 106% in lamp watts and 115% in ballast loss watts. At 130 volts, the ballast loss watts increases to 127%.

tures due to confinement or crowding of the lamps also results in a measurable decrease in light output.

Lamps in the 2⅛-inch diameter, as well as the RF type, consume somewhat higher wattage per foot of tube length and consequently low temperature precautions are less stringent. With the higher wattages involved, however, it is important to avoid operating conditions which result in high bulb temperatures. Since ballasts and lamps are both sources of heat, they should be far enough apart so that the heat from one does not help to overheat the other.

Light Output Depreciation

Before rating lamps for light output, they are first burned for 100 hours, since there is a fairly rapid reduction in output during this period. After passing the 100 hour mark, further depreciation is gradual, amounting to about 15% of the 100 hour rating at the end of life. This gradual depreciation is not so much the result of local darkening at the lamp ends, but

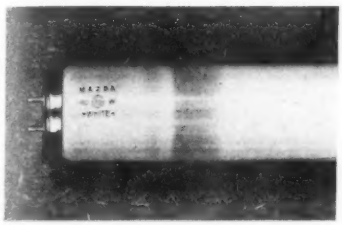


Fig. 1. Dark gray or brownish rings may develop at either end or both ends as a result of normal cathode consumption.

rather the almost imperceptible discoloration which occurs throughout the length of the tube. This is quite different from spots or streaks caused by condensed mercury droplets which sometimes appear on the under side of the tube or where a fixture part lies close to it, causing localized cooling. Ordinarily this mercury deposit disappears when the lamp is thoroughly heated up. If it persists, however, to the point of becoming unsightly, the evaporation of the mercury can be hastened by rotating the lamp in the lampholders.

Fluorescent fixtures have large areas which are sometimes susceptible to dirt collection. Also the lamps themselves collect dust, consequently it is highly desirable to clean reflectors and translucent parts of fixtures and lamps at regular intervals, even between lamp replacements. Lamps which have given good service and show severe blackening at the ends may well be considered for replacement before complete failure.

The matter of lamp life is always important and especially is this true with fluorescent lamps because of the higher replacement costs. In the case of filament lamps the life expectancy is so completely predictable from data obtained by watching many thou-

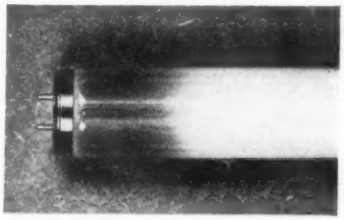


Fig. 2. A properly operated lamp suffers a gradual loss of cathode coating and may develop dense blackening for two or three inches at the ends of the tube.

sands of them burn out, that there is an insistent demand for further knowledge on fluorescent lamp life. Life prediction with fluorescent lamps is a much more complex matter, with such things as burning hours, voltage and operating conditions, and number and nature of the starts having to be considered. While the general effects of most of these conditions are known and will be discussed, it is still too early to make quantitative evaluations; it is necessary to make life tests to determine actual life under a given set of new conditions.

Estimates of fluorescent lamp life in average service must always take into account the frequency of starting. It is not possible to state that each start is the equivalent of a certain number of hours steady burning, but life is definitely longer if lamps are burned many hours for each start. The more nearly perfect the starting conditions, starter performance and operating circuit conditions, the less important this becomes.

Optimum Starting Conditions

Fluorescent lamps are equipped at each end with a small filament coated with a material which gives off electrons freely when heated.

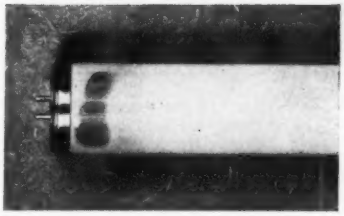


Fig. 3. A dense black spot such as this may develop near the end of lamp life, but the formation of such a spot early in the lamp's life is an indication of excessive starting or operating current.

These coated filaments, or cathodes, act as terminals for the arc discharge within the lamp. The purpose of this type of cathode construction is to make lamp starting easier without having to apply high voltage between the ends of the lamp. Early experimental fluorescent lamps were started by applying a voltage sufficiently high to start a discharge, which heated the terminal cathodes, producing electrons and permitting subsequent burning at a reduced voltage. In general, the necessary starting voltage amounts to so many volts per inch. In addition, when the terminals are cold, several hundred volts are required at the terminal to make up for the fact that there is no supply of electrons present. It was immediately observed that with a cold start the violence of the starting discharge knocked active material off the electrodes, thus shortening the lamp life by rendering them incapable of burning at the usual voltage provided. If these cathodes are heated before the starting surge is applied, the gases surrounding them are ionized by the electrons emitted by the active material coating, and thus rendered electrically conductive. Under this condition of thorough terminal preparation the voltage needed to start an arc is greatly reduced. If a powerful impulse is then applied, the arc may establish itself before the voltage reaches more than a fraction of the maximum value. The destructive energy in the peak of the surge is then easily absorbed by the highly conducting arc stream. Lamp starting on the basis of a preheated cathode, accordingly, has been almost universally applied, and this means that lamp life is virtually determined by cathode condition.

The importance of cathode pre-

heating has led to extensive developmental work in devising suitable automatic starting switches, or "starters" as they are generally termed. One desired quality is a firmly closed circuit through the cathodes, maintained for a sufficient period to provide the prescribed cathode preheating. Studies of cathode heating requirements have shown that heating is proportional to the product: (Heating time x square of the heating current), and for proper operation this product should equal a constant. Thus, if the current is low, considerably greater heating time

Starter Characteristics

is required. The most successful starters, therefore, are so designed that if low preheating current flows, the heating time is prolonged, and vice versa. Maintenance of the proper heating current is most important and will be mentioned later on. Insufficient heating before a starting attempt is made may lead to cathode sputtering if the attempt is successful, or repeated attempts may be necessary, resulting in annoyance and some additional cathode punishment. The presence of a fluorescent glow at the ends of a lamp is evidence of adequate heating.

The magnitude of the starting surge is another factor, for even with satisfactory heating a weak surge may fail to start the lamp. A sharp, positive breaking of the starter contacts is therefore necessary. As more and more research is devoted to lamp starting, and the construction and manufacture of starters, their operation approaches closer to the desired optimum.

A number of external factors exist which materially affect the starting of lamps and the life of the cathodes.

The current which must be supplied by the ballast for preheating is greater than the normal operating current. In the leading power factor branch of a Tulamp ballast, the tendency is for the current to maintain a nearly constant value. For this reason a starting compensator is required in the leading lamp starter circuit of 15-20-30 and 40 watt Tulamp ballasts to permit a higher current to flow through the cathodes during the preparatory interval before the lamp starts. Since the surge provided by this circuit tends to be more violent than in the lagging circuit, the proper preheating of the cathodes of the leading lamp is particularly important.

A supply voltage near the center of the ballast rating helps assure adequate preheating current through the cathodes, and consequently, more reliable starter and starting performance. At the same time, the strength of the starting surge is maintained at the desirable level. In addition to the requirements of ballast design already mentioned, the ballast is called upon to deliver a certain preheating current during lamp starting. A fault in ballast design such that low heating current flows under normal conditions of voltage supply affects starting in the same way as low line voltage. Excessive heating current, due either to high supply voltage or incorrect ballast design, causes a more rapid using up of the cathode coating material through electronic emission.

During steady burning, when the cathodes act simply as terminals for the arc, the cathode area serving as the terminal becomes very hot. Under conditions of high line voltage the arc current increases, causing excessive heating of the cathode with results similar to those just described.

Lamp End Blackening

To summarize cathode depreciation, there are several distinct effects. Cathode heating effects due to passage of current during preheating, and cathode heating effects during normal burning while the cathodes act as terminals for the arc, are similar insofar as they affect the blackening of the ends of the lamp. Dark gray or brownish rings (see Fig. 1), which may develop at either end or both ends, are principally the result of normal cathode consumption.

At the instant of starting, the surge of voltage takes the form of an electrical collision, and particles of material are thrown off from the cathode in all directions. If the cathodes have been heated beforehand, the voltage is held in check and the damage done is comparatively insignificant. However, with inadequate preheating or premature starting of the lamp, cathode punishment at starting becomes sufficiently serious to cause a general blackening of the lamp ends. A lamp which has been operated properly throughout its life suffers gradual loss of the cathode coating. When the supply of electron emitting material becomes very low, starting grows increasingly difficult and this results in effects which are similar to those produced by insufficient preheating. Thus a lamp on the point of failure may rapidly develop dense blackening for two or three inches at the ends of the tube. (See Fig. 2.)

Near the end of life some lamps develop a very dense black spot about one-half inch wide extending almost half-way around the bulb and centering about one inch from the base. This is quite normal near the end of life, but should such a spot develop early in life, it is an indication of excessive starting or operating current. This may be due to a ballast off-rating or to an unusually high circuit voltage. (See Fig. 3.)

The events taking place at starting are retarded at low temperatures, so that difficulty may be experienced in getting lamps to start. The following suggestions will be found helpful in assuring satisfactory starting below about 50° F.

(1) Assure an adequate voltage supply. Values even above the center of the ballast rating may be applied advantageously.

(2) Starters which provide a long preheating period and a sharp break are desirable. While starting will be slower, it will also be more positive.

For those lamp sizes where they may be obtained, thermal type starting switches are desirable for low temperature conditions. Where feasible, manual push button starting for each lamp may be adopted.

Spiralling, Blinking, and Starter Effects

A swirling or snaking effect in a lamp is generally due to the presence of substance other than mercury vapor in the arc stream. It is usually a transitory phenomenon and likely to cease after a few hours burning. Swirling is largely associated with new lamps; before they leave the factory, lamps undergo an aging process to eliminate this tendency as far as possible. In a lamp already burned for a considerable time, material thrown off as a result of incorrect preheating at the time of starting may induce a recurrence of spiralling.

An excessive number of flashes at starting, indicates a difficult starting condition. If the starter

(*Continued on page 46*)

Contractor Lighting Sales Aided by Training Program

By L. H. Houck

SALES and promotion campaigns come and go and even lighting campaigns ebb and flow through the electrical industry like ocean tides. Great pushes with even greater quotas have been common and no doubt have done worlds of good, but there is only one thing that will relieve low volume which comes the day after a great drive is over. That remedy is the slow, sure and painstaking educational campaign which has no beginning and no end—always and forever carrying on.

This has been the essence of the non-spectacular program of the Tampa Electric Company's lighting department, under the direction of James A. Banton, illuminating engineer.

Promotion of modern lighting at the Tampa Electric Company has been no sporadic burst of energy, which dies down later, but it has been a united and concerted effort to combine teaching, learning and cooperation between utility, contractor and building owner to the end that the contractor is able to sell the customer the right lighting because the customer wants to buy it.

Nearly all the lighting engineers in other parts of the state are agreed that Mr. Banton was a year ahead of time, when three years ago he was around talking power factor in connection with the coming fluorescent lighting.

A short time later the company announced that a power factor of 80% or higher would be required on all gaseous tube lighting. Incidentally, the Tampa Electric Company was the first utility in the state to enforce such a regulation. Representatives of the company personally contacted all contractors and jobbers operating within their territory and explained the reason for this regulation, explaining that this was no unreasonable demand on the part of the company as some had thought, but that the use of high power factor equipment benefitted not only the company but the contractor and customer as well.

They explained, and Mr. Banton demonstrated in his meetings, how with the use of high power factor, illumination in an old store could be increased two or three times without rewiring, how better voltage could be maintained at the ends of circuits thereby improving the operation and light output of lamps, how heat losses are decreased with an accompanying decrease in the load on air-conditioning systems (an important item in Florida), how "high power factor" did not mean "high power consumption" as many thought, but in many cases, actually lower power consumption.

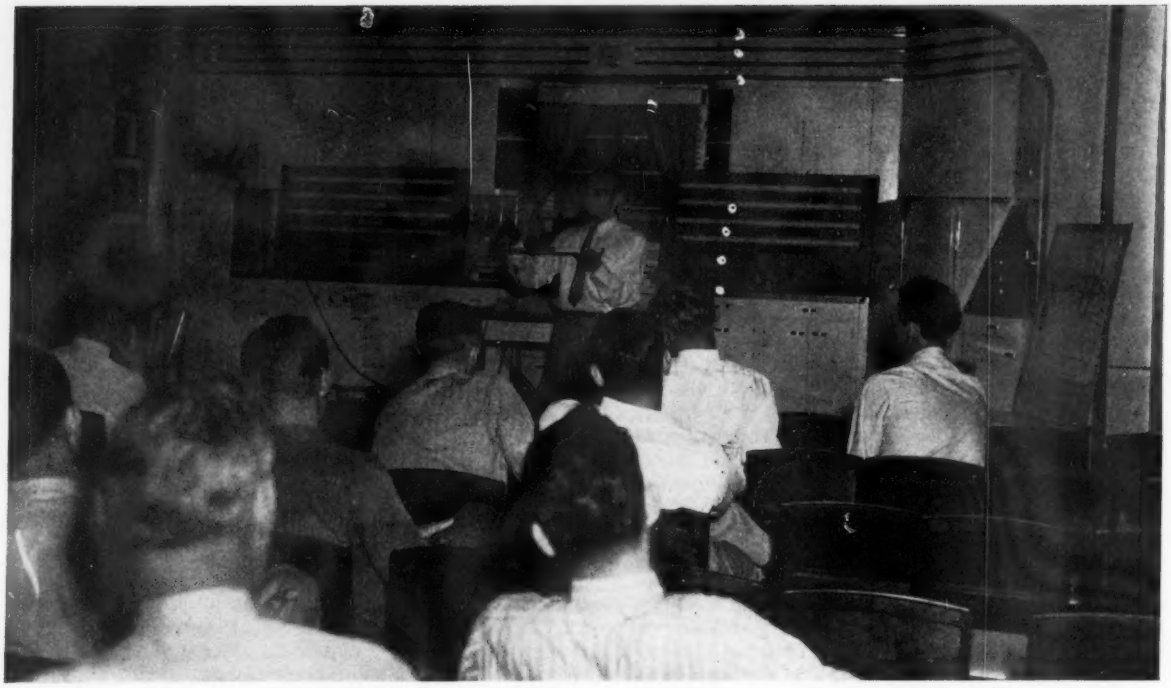
At that time two-lamp auxiliaries were not in use and high power factor single lamp auxiliaries were rare, so power factor had to be corrected by the use of capacitors placed in the fixtures or wiring channel. Since additional equipment and expense were necessary, the company was lenient and required—or requested, as they prefer to call it—only 80% power factor. Now 95% power factor can be gotten just as easily. The result is that contractors and jobbers operating in the Tampa Electric Company territory have understood power factor and have cooperated enthusiastically.

"For years contractors have been crying for a white light in a tube," Mr. Banton said, "and then when they had a little trouble in the beginning many of them refused to have anything more to do with it which was just about as sensible as killing the goose which had come to lay a golden egg in the contractors's lap.

"There were other contractors," he continued, "who were of the 'never give up' type, and these progressive men became the first to profit from modern fluorescent lighting."

Contractors in the Tampa Electric territory have had less trouble with fluorescent than contractors in most other districts of the South

The educational meetings conducted by James A. Banton, lighting engineer for Tampa Electric Company, have been most helpful to the contractors and electricians attending them. By means of test equipment such as that shown here, Mr. Banton has been able to pass over highly technical and theoretical considerations and instead demonstrate by actual meter readings just what happens in the electric circuit when various different types of lamp auxiliaries and methods of connections are used. George Bell, left, of Bell Electric Co., looks on while Mr. Banton completes a test.



Mr. Banton has been holding these informal educational meetings among electrical contractors and electricians for nearly three years. The results have been more lighting sales and installations of better quality and design.

and have sold more lighting than most, all of which was due to the long-range program inaugurated by Mr. Banton.

The success of the plan was found in holding meetings with contractors throughout the territory, who were invited to attend and bring any of their employes they wished. These meetings were on the order of a round-table discussion of problems, but were opened by Mr. Banton with a short lecture, illustrated with charts, and using sample equipment to prove points.

Graphic Demonstrations

With a board on which was mounted a voltmeter, an ammeter and a wattmeter, and other connecting boards on which were mounted various types of lamps and associated equipment, he was able to throw theory away and show his audience through actual meter readings and demonstration what happened with various equipment. Power factor, that mysterious something which reared its head in the lighting industry's Garden of Eden, was speedily and promptly stripped of its mystery.

Then with boards on which were mounted lamps wired with low power factor ballasts and others with high power factor ballasts connected to his instrument board, he graphically demonstrated the effects. He also showed what happened when capacitors for power factor correction were introduced in circuits needing them.

He told his audiences that while the power company was requiring use of equipment and auxiliaries giving a power factor of 80 per cent, they did not propose to set up an arbitrary rule which had been born in a mysterious atmosphere. On the other hand, they were interested as a utility which merchandised power to satisfied customers. Those who bought and installed fluorescent lamps, using contractors doing business in the Tampa Electric territory, were certainly entitled to adequate and proper lighting after the contractor had picked up his tools and gone home.

The meetings brought out the fact in no uncertain terms that a dissatisfied customer was not only a pain in the neck to the power company but was also a damaging factor in the business of the contractor and a serious contender that might affect the profits of all contrators. By selling lighting instead of fixtures, the contractors were told, they were building themselves a business which would be everlasting.

The first meetings, according to Mr. Banton, were not so well attended, but as the interest increased the crowds grew and the questions were more numerous. In many of the towns in the area served by the Tampa Electric Company, the utility has fully equipped "leisure houses" where cooking schools are held and refrigerators and stoves are demonstrated to classes of women, and these meeting places were used advantageously.

In smaller towns, school houses were used as meeting places and meetings were held sometimes as often as four times a week. It was the idea to eventually get every contractor and as many of his men as possible to the meetings. The meetings have been held for almost three years.

Some of the best boosters for fluorescent lighting today, Mr. Banton said, are contractors who had trouble at first and decided not to sell fluorescent. This is the result of removing the mystery and making it easier for the contractor to install trouble-free equipment.

Some of the topics discussed at

(Continued on page 48)

Fluorescent Lighting Adds Glamour to Stage Shows

By Ward Warburton

LONG a convert to the theory that the best obtainable in talent and costuming is not good enough, the Royal Palm Club, internationally-known theatre restaurant at Miami, Fla., recently stepped up the glamour-voltage of its "attractions" by a unique use of fluorescent lighting. In the opinion of Wm. R. Sutton, the club's lighting technician, who designed the installation, it is the first of its kind in America.

"Our featured merchandise," says Mr. Sutton, "is our entertainment. Royal Palm's show costs the club thousands of dollars per week. An investment of that size seems to deserve lighting that would make the most of it. While we never had heard of fluorescent stage-illumination, it appeared to offer the best possibilities for obtaining the effects we wanted. Knowing of no source of supply where we could buy such an installation ready-made, we had to design it ourselves and have it built to order."

Formerly a display-lighting specialist at Gimbel's department store in Philadelphia, Mr. Sutton is an enthusiast regarding the "color-kind" qualities of fluorescent illumination. Moreover, he was able to call on his experience in creating an application which would produce the results he was after.

Not only does his stage-lighting system render true color-values in the costuming of the elaborate stage presentations in which the club specializes, but it also "dramatizes" color and creates new effects. In other words, it combines the functions of three types of conventional stage equipment: footlights, borders and X-rays.

Royal Palm's installation consists of 16 fluorescent fixtures set at a 45-degree angle to the stage ceiling. Conforming to the semi-circular shape of the stage, the fixtures are pyramided in six banks.

At the front-stage apex of the pyramid pattern one fixture is spotted. The others are located behind it in a grouping of 2, 3, 3, 4 and 3 fixtures.

Each fixture contains twelve 30-watt lamps in a dual arrangement of white, daylight, and four colors: yellow, coral pink, blue and green. The lamps are placed in the fixture from front to rear in the order given.

Lamps of each color (considering white and daylight as "colors") are wired in series on a single circuit, simplifying control. Operated from a booth above the mezzanine at the opposite end of the dining room, and facing the stage, lighting in a single color or in a wide variety of combinations may be switched on in a split-second.

No "dimmers" are necessary in order to produce a smooth transition from one effect to another. The natural characteristics of fluorescent lighting and the mechanics of the lamps themselves take care of that.

The operator has only to throw the switches for the next color-combination just before a change of lighting is due. The result is a highly effective blending in of the new color, as one set of lamps fades out and the next gradually comes up to its full light output.

From the 18′x30′ stage, an oval, raised platform, 24′x46′, extends out into the dining room. Planned especially for chorus numbers, this platform or "floor" is lighted by thirteen 500-watt and two 2000-watt "spots" recessed at a 45-degree angle into the dining room ceiling. As auxiliary illumination, the light-control booth is equipped with eight 2000-watt and one 3000-watt tungsten spots and one 100-amp. carbon spot.

The first use of the fluorescent system demonstrated its effectiveness for lighting costumes and back-drops. It also revealed the necessity for matching light in the dressing rooms to enable performers to make up properly.

This flaw in the perfection of the setup quickly was remedied by

Above, back-stage view of the sixteen 12-lamp fixtures installed for stage lighting effects in Miami's Royal Palm Club. Fluorescent lamps were required in dressing room, at right, to facilitate accuracy in entertainers' make-up.

the installation of fourteen 40-watt fluorescent fixtures. Each containing a 20-watt white lamp and a daylight lamp of the same wattage, these are suspended over the dressing room make-up tables.

"The subject of 'make-up,'" explains Mr. Sutton, "suggests another advantage in the use of cool fluorescent lighting for stage illumination. When all lamps are on, we are burning nearly 6000 watts. In spite of that, make-up stays fresh until the show is over.

"And the entertainers seem very enthusiastic about the installation. They tell me that not only does fluorescent lighting 'build up' their acts but that the lower heat-output enables them to do better work.

"That angle interested the orchestras. They demanded fluorescent lighting too, so we installed a 20-watt lamp over each music stand. Here again we have every reason to think that we get better performance because the orchestra members claim that in addition to lower temperature they can read their music more readily."

An orchestra platform at each side of the stage makes it possible to work two bands. When these were fluorescent-equipped still another idea suggested itself. Four 30-watt lamps were installed end to end in a continuous line under figured drapes near the ceiling in the wall-spaces at right and left of the orchestra platforms.

This installation serves a dual purpose. It balances the illumination at that end of the dining room and at the same time it highlights the design of the drapes, producing a highly unusual decorative effect.

There is a close analogy, according to Mr. Sutton, between the use of lighting effects to dramatize costumes on a stage and the employment of the same technique to highlight similar materials on display in a store window. And he sees no reason why an adaptation of the Royal Palm installation would not produce equally satisfactory results, if applied to department store display.

The owner-manager of the Royal Palm Club is Arthur Childers. The fixtures for its fluorescent stage-lighting were made by W. D. Bartlett, Miami fluorescent-fixture manufacturer. The wiring of the installation was done by the Wagner Electric Co., Inc., of Miami.

Three Million Square Feet Lighted by G-E "49-ers"

THE FORTY-NINER Club movement, the crusade launched early this year by the Lamp Department of General Electric Co., at Nela Park, is panning out to be a mighty force in lighting up stores, offices, and factories . . . up to 200 footcandles!

Nearly 2,900,000 square feet of space in defense industries and in commercial locations had, by August 1, been lighted up to "49-er" standards. Some 700 prospectors, sourdoughs — modern Argonauts, armed with fluorescent and high-efficiency filament lamps and fixtures designed to provide higher levels of illumination—are today proud wearers of the 49-er lapel nugget pin. Several are "nugget-eers" with more than five 49-er jobs to their credit.

This dramatic promotional effort, according to H. Freeman Barnes, sales promotion manager of GE Lamp Department and author of the campaign, is proving many claims. For example, the results clearly show that there is a real market for 49 (or better) footcandles; that utilities and others need only stake off a few claims, begin panning for "gold," and strike it "sure"; that customers of such high level jobs are tickled with the wealth of benefits which the better lighting brings in terms of employee morale, efficiency, and sped-up production and sales; and that there's reasonable profit for all concerned.

Well over 500 defense industries, stores, and offices today are functioning under the near-to-daylight jobs installed by enterprising modern gold-rushers whose chances differ from those of sourdoughs of nearly a century ago in the fact that the venture of modern 49-ers is practically without gamble.

Among 49-er cool facts uncovered by analysis of hundreds of accepted applications are these:

Footcandle readings of these lighting jobs range from slightly more than 50 maintained footcandle levels to 200; watts add up to nearly 9,000,000; the total area so lighted, if streamlined into a trail one foot wide, would reach from Nela Park to Dubuque; nearly 400 of these 49-er installations are lighting up customer properties; some 80 are setting glowing examples of eye comfort and sales appeal in utility properties; about 50 are illuminating as many GE properties.

Eighty per cent of the lamps employed in the project thus far have been GE Mazda fluorescent lamps of which the bulk has been the 40-watt type. But the 100-watt F-lamp and the RF 85-watt types are showing the most gain of late. GE Mazda filament lamps account for about 11 per cent of total. The remaining jobs are combination F-lamp and filament lamps, GE Mazda Mercury H-1 alone or linked with "incandescents."

Of the vast space lighted with fluorescent lamps by 49-ers, F-lamps have averaged one tube for every 15 square feet of office, store and industrial area.

Leaves from a Notebook On Fluorescent Lighting

(*Continued from page 31*)

sit where placed—indefinitely. (Certain cities have regulations concerning mounting of ballasts inside fixtures—discover them, if you can!)

A ballast must have air—don't wrap them in heavy coverings. This drowns the hum—and the ballasts at the same time. Ballast temperatures must never exceed 190° F. under any operating condition. Ventilation of the housings for air circulation or large radiation surfaces in direct contact with the ballast case are necessary precautions against overheating.

* * *

To compensate or not to compensate should never puzzle the electrical contractor, for *not* to use compensators means short life for the lamp connected to the capacitative element of a two-lamp ballast. Compensators guard the electrodes of the lamp in the capacitative circuit, protecting it from "cold" starting. After starting, its protection is no longer needed; hence the circuit is so arranged that it is automatically disconnected until the next starting process.

COMPARATIVE STROBOSCOPIC EFFECT OF VARIOUS LAMPS

	Lamp and Method of Operation	Relative Stroboscopic Effect*
1.	200-Watt Mazda Incandescent	1
2.	40-Watt Incandescent Lamp	7
3.	Green Mazda F—Single Lamp	11
4.	White Mazda F—Single Lamp	19
5.	Daylight Mazda F—Single Lamp	21
6.	Blue Mazda F—Single Lamp	23
7.	White—2 Lamp Ballast	9
8.	Daylight—2 Lamp Ballast	10
9.	Daylight or White—3 lamps, each on a different phase of a 3-phase circuit	3
10.	White—3 Lamps, One on individual ballast, remaining pair on two lamp ballast	14
11.	Daylight—3 Lamps, One on individual ballast, remaining pair on two lamp ballast	15

*Based on ratio of light output during cycle above mean average to total output at mean average.

Fig. 8. Two-lamp ballasts have many advantages over other types. One of these is the greatly reduced stroboscopic effect as indicated in the above table.

Aristocrats of the ballast family are the two-lamp branch because they have so many superior and desirable characteristics. Automatic power factor correction is one of their best qualities, of course, but they have others: they automatically reduce flicker (stroboscopic effect) as shown by Fig. 8; they consume appreciably less wattage per lamp in the 30 and 40-watt sizes than that consumed by two single lamp ballasts; finally, for 30 and 40-watt lamps, the cost is less than two single lamp ballasts.

Speaking of aristocrats, be certain to get pedigree watch dogs (ballasts and starters). They are, of course, the certified kind, for certification means maximum service per dollar of auxiliary cost and lamp cost. And this kind of insurance for the future costs very little more.

* * *

Sooner or later somebody has to pay—the customer for good fluorescent lighting, or the customer and the salesman for poor fluorescent lighting. I define poor fluorescent lighting as that type which "cuts a customer's light bill in half." Just what is a customer's light bill, anyway?

Not many customers really know—and few salesmen will tell them. Those few who do are the good ones who have faith in their jobs and in the future of fluorescent lighting. A light bill should be no mystery—let's take it apart and expose its insides to public scrutiny.

There are two main parts to a light bill; fixed charges and operating charges. Each of these parts are divided into two other parts as follows:

Fixed Charges:

Wiring Investment—The allowance per annum will depend on many conditions, a figure of 15 per cent of initial cost is conservative for commercial applications. In industrial applications, this figure may be reduced, based on estimated life of the installation before obsolescence. For taxes, interest, and insurance, an additional figure of 10 per cent (of original cost) should be included.

Luminaire Investment—Allowance similar to those for wiring charges should be used, unless other detailed information suggests certain adjustments. Auxiliary equipment costs must be included if not part of the luminaire.

Operating Charges:

Lamp Costs—The new cost of lamps should be used, with a prorata allowance for hours of operation as compared with average rated life.

Current Costs—The exact current cost may be calculated on a basis of operating hours, including wattage consumption of the auxiliary equipment.

It is interesting to note that only current cost actually appears on the bill from your service company—a really insignificant part of the total lighting bill, yet most people think this is all they spend for lighting each month. This misunderstanding has often been used unscrupulously by salesmen who load their coustomers down with fixed charges and save them a few pennies on the current cost—without improvement in lighting conditions in most cases. Whether fixed charges are paid in a lump sum or by the month—they are still part of the light bill.

Fluorescent lighting with its higher lamp and fixture costs can be more expensive than filament lighting for certain installations in spite of high efficiency. In general, fluorescent costs no more and, in many cases, is less costly than filament lighting. When in doubt, analyze the various cost elements giving due consideration to all local conditions involved. Table 3 has been arranged to make this analysis more or less routine arithmetic.

How fortunate the salesman who makes use of the greater efficiency of the fluorescent lamp to give his customer more eye comfort through better lighting. He is thrice-blessed: by the customer for real service; by his conscience for a job well done; and by his pocketbook which bulges with extra dollars of profit.

If I were a salesman I would build more of my sales story on fluorescent lighting around these important customer advantages;

1. Eye comfort
   Lower Brightness,
   Better Diffusion,
   Higher Levels (higher efficiency)
2. Bodily Comfort
   Cooler light (less radiant energy)
3. Choice of colors (for seeing)
   3500° White
   Daylight
   Soft White

Few salesmen realize the potential sales appeal latent in the last item. For years the privilege of choosing the color of your car has been an effective sales appeal in automobile advertising. People like to have the opportunity to choose when they spend money.

For the first time, they have that privilege when it comes to lighting their homes, offices, stores—let's make the most of this advantage. It's true that level is more important than color in seeing—but people, nevertheless, have a preference; some for the cool colors, others for warmer tints, and stoutly maintain they can see better under light of their preferred tints. I know of a spinster who reads detective novels only under red lighting—she maintains they are more thrilling that way.

But why read detective stories for thrills? It's thrill enough to be part of an infant industry which sold 100 million dollars of fluorescent fixtures, ballasts, lamps, and wiring last year, and which has plans to sell 250 million dollars worth this year. By golly, I bet they do it! There's sense in fluorescence—and money, too!

Dramatizing Lighting Sales Appeals

(*Continued from page 25*)

good lighting. Our advantage, however, is of no use to us unless we can display it forcefully and put it to work.

All the sales appeals listed above cannot be used on a single prospect, but we can pick out those most likely to be of interest to the individual on whom we are working, then portray these advantages as realistically as possible—making them have as much personal appeal as we know how. This is the type of showmanship that brings the best results. It is being used successfully by many competing interests, and, if given a chance, it will serve us equally as well.

Good Performance from Fluorescent Lamps

(*Continued from page 40*)

and the lamp perform properly in a test circuit, the cause may be due to low voltage, insufficient current supplied by the ballast for preheating, absence of the starting compensator where required, or low temperature surroundings. Incorrct wiring of a Tulamp ballast may be the cause.

When a lamp known to be in good condition shows no response of any sort at starting, the first assumption is that the starter is inoperative and needs to be replaced. Improper seating of the lamp in the lampholder, and incorrect wiring connections may also be responsible.

Continuous blinking or flashing of a lamp usually indicates that the lamp has reached the end of its life, and the cathodes have lost practically all of their active material. In this case the starter or lamp should be removed immediately to avoid this destructive continual operation of the starter. This condition results ordinarily in excessive current being drawn from the ballast. Overheating and possible injury to the ballast may result.

Sometimes the ends of a lamp will glow steadily with no effort to start. Although incorrect wiring can give this result, a damaged starter is usually the cause. When a failed lamp is not promptly removed, this type of starter trouble is somewhat common.

When a lamp fails to remain lighted, and goes out at more or less frequent intervals for a second or so, but burns properly in another location, either extremely low line voltage or a defective starter is likely the cause.

Starting Without Preheating

From an early date, development work has gone on, both from the standpoint of lamp construction and auxiliary devices, to enable lamps to be operated satisfactorily without the present great dependence upon careful preheating. A variety of experiences with series operation of a string of lamps on several thousand volts have been recorded. It is concluded that although starting is without any preheating whatsoever, the arc strikes and seats positively on the cathode in a very brief interval. The cathode punishment is unquestionably much more severe than with proper starting with preheated cathodes, but perhaps is less severe than under some conditions of starting with insufficient cathode preparation.

Installations where two-lamp units are started on medium high voltage without preheating have shown similar results. General blackening of lamp ends as well as the normal formation of rings is to be expected, and if lamps are started frequently, blackening may be very severe. There will likely be some increased tendency toward swirling with cold-cathode starting. Transformer ballasts suitable for use with this sort of operation require an entirely new basis for design. Control of losses, reasonably good maintenance of lamp wattage, and the arrangements to give the full advantages of Tulamp ballast operation are serious problems.

At the present time, with tremendous emphasis being placed upon highest production capacity, fluorescent lighting installations are being burned for very long hours. The comparatively small number of starts required are distinctly favorable towards acceptable lamp life under such conditions as discussed above. The subject of cold cathode starting is being given intensive study at the present time and significant conclusions may be forthcoming.

Today's Opportunities For Lighting Sales

(*Continued from page 26*)

experience, it will have established its value; its mysteries will have become understandable facts; and a new perspective will have been gained about what a good lighting job should have. Until we take brightness into consideration in planning a lighting system, we cannot make rapid progress toward 100 footcandle and higher levels of illumination. These higher levels must come: first, because industry and commercial establishments demand them; second, because higher levels are a source of a potential market for the lighting industry that is bigger than any market we have ever enjoyed.

The visibility meter is another tool which can be used to excellent advantage in selling higher level installations. Perhaps it is most valuable in the industrial field where a study of seeing conditions is of greatest interest and importance. With it we can determine, for example, how much illumination is necessary to make a given task as visible as is 10 point Bodoni type under 10 footcandles. When it is revealed that a certain task needs as much as 200 or 500 footcandles, we realize that we need to control brightness, distribution and heat of the lighting system. We realize that the recommendations of footcandle levels now published in our various lighting bulletins, catalogs and magazines are but a compromise with the footcandles actually needed. We can readily see that the business we now get from ordinary lighting jobs is a mere drop in the bucket compared to the potential business resulting from jobs delivering footcandle values indicated by this meter.

Selectometer Valuable Aid

And now comes another tool which the lighting salesman can use to raise illumination levels: the footcandle selectometer. It is a portable device which permits a prospect to determine how many footcandles he would like to have for various seeing tasks. It is a simple device which sells better than words can tell the desire for high levels of illumination because the prospect convinces himself through his own selection that he wants more footcandles.

Fluorescent lamps are a selling tool in themselves. They have so captured the imagination of the public that a new interest has been aroused in lighting. It is unfortunate that much of the selling of fluorescent lighting has been done on the basis of reducing electric bills. There are so many other selling features of fluorescent lighting that help to sell the job or to increase the volume of the sale that it is not necessary to sell it on that basis alone.

Then, too, such selling arguments often have led to dissatisfied customers. Merely substituting a fluorescent fixture for an existing incandescent fixture might not always give as much or as good quality illumination. Where the illumination is improved, the electric bill might not be reduced. For example, it has so often happened that better lighting is conducive to operating the lighting system longer hours thereby overcoming any saving that might have been anticipated

through reduced connected load.

Working under poor lighting is no incentive to keep the lamps burning. When someone turns off the lamps which provide good illumination, a vigorous complaint is raised. Reduction of energy costs based on connected load alone is not always a safe bet. Moreover, inexperienced salesmen sometimes make such extravagant claims for cost reductions that they can never be realized. Such selling makes for dissatisfied customers and arouses suspicion in the customers mind with the result that the progress of the lighting industry as a whole suffers.

Even with as much lighting education as we have had in the past several years, we still need more. So many new developments are constantly being brought out that the public cannot keep pace with lighting progress. Also, a new generation is constantly filtering into the field of lighting customers which needs to learn the old, fundamental features of lighting as well as features of new developments. Constant reiteration of these things by advertising, demonstrations, and word of mouth is essential to continued progress.

Many people consider incandescent lighting to be completely outmoded and old fashioned with the advent of the fluorescent lamp. The incandescent lamp will play an important part in lighting for a long time to come. It has the important features of simplicity and low unit cost; it can be dimmed; it can be controlled with great accuracy due to the concentration of the light source. There are ever so many applications where these features of incandescent lamps make them supreme.

Infra-Red Possibilities

Another field related to lighting in which there are great possibilities is the infra-red. New applications are cropping up every day for infra-red lamps. There are hundreds of jobs which they can do with greater facility, higher speed and greater economy. Contractors and others reaching this field should cash in on the splendid opportunity.

There may be increased curtailments in lighting equipment in the next several months. Substitute materials will rapidly take the place of those items that are difficult or impossible to secure. Other fields may suffer a great deal more because the lighting industry does not require the relative homage of metals and other materials needed by other industries. The lighting industry, therefore, is in a favorable position.

Every place where seeing is important is a prospect for good lighting. We have had excellent progress in the past but the need for better lighting, and the large number of effective tools with which we have to work, places the lighting industry in a position where the progress of the past can be made to appear stagnant. A fair knowledge of lighting fundamentals, a consistent use of all of the tools for selling better lighting and a determination to sell every prospect will mean prosperity for every branch of the lighting industry.

Modern Lighting For Industry

(*Continued from page 35*)

erning factor, but as a rule, these units are applied at heights of more than 20 feet above the work surface. When combined with each other in high-bay areas, the lamps are generally placed on an alternate staggered arrangement. As the name implies, mercury and incandescent lamps are placed in alternate outlets.

An effective arrangement is to use two 400-watt H-1 mercury lamps at a location, in twin high-bay reflectors side by side. These are operated from a Tulamp transformer, thus minimizing stroboscopic effect. At the alternate locations are 1000-watt incandescent lamps. It is recommended that the spacing between the units be not more than 0.8 the maximum possible spacing of an incandescent or mercury system. In this way, if either system is used alone, a fair degree of uniformity will be obtained.

Some of the new defense plants, especially those designed for the assembly of aircraft, have high-ceilinged rooms that are enormous in extent. In many of these the seeing task is made more severe by the fact that workmen are often likely to be looking almost straight up, and furthermore the room is full of polished surfaces at all angles and of various contours. For this type of work the low-brightness of fluorescent lamps is very desirable. If the room is large enough even these quite-diffuse sources can be used at fairly high mounting heights with good efficiency. (Mr. George J. Taylor will present a paper at the I. E. S. Convention at Atlanta, on the application of fluorescent lamps to large factory rooms.)

In those low-bay areas where the seeing tasks are not critical and prolonged and where recommendations call for approximately 20 footcandles, an incandescent lamp system is suggested. Of the various equipments available, the Glassteel Diffuser provides the highest quality of lighting. Where the service is even less exacting, use the RLM dome reflector with white bowl Mazda C lamps.

A relatively new luminaire for incandescent lamps is the Silvered Bowl Diffuser. This unit combines the efficiency and ease of maintenance of the RLM Standard Dome reflector with the low-brightness of the Glassteel Diffuser. It consists of a procelain-enameled steel reflector, having a semi-diffusing Alzak aluminum insert and is designed for use with the silvered-bowl lamp. The aluminum insert makes possible a more even distribution of illumination over the working area than has heretofore been possible with porcelain-enameled units.

Supplementary Lighting

Supplementary lighting units provide the finishing touch — the tailor-made part of industrial lighting. They include a wide variety of shapes and sizes to suit any requirement. They are in small relatively concentrating units for producing high footcandles over a small area. At the other extreme there are the large-area, relatively low-brightness equipments for the soft effect that is so necessary for some of the most difficult seeing tasks, such as reading fresh-proofed type. And there is a wide variety in between. The new fluorescent lamps are especially suitable for this service. Because of their coolness they can often be located relatively close to the work with the reflector cut-off below the eyes of the worker. Because of their relatively large size and low brightness, the quality of the lighting is well suited to a large percentage of the seeing tasks found in industry.

The determining factors in a choice of these equipments are the footcandles required, the desired type of lighting, whether diffuse or harshly directional, and the

amount of money available.

Dirty lighting equipment can rob the owner of half or more of his light, for which he is paying in full for lamps and electrical energy. Much more could be said about this vital matter than space permits. The system must be planned to make cleaning easy if it is to be done properly afterwards and if the plant is to get its money's worth.

Reflectors should be quickly-detachable for cleaning. Nothing seems to take the place of water and soap or other cleaning solution. I mean a good thorough cleaning in a bucket or pan. Wiping with a damp rag just pushes the dirt around on the reflector from one place to another. Trying to do a better job without removing the reflector often means spilling water on machinery or work.

Provide a means for getting at the reflectors. If step ladders won't reach, perhaps a crane will. Or a special platform on the crane. If no other means are available, each unit should be on some form of disconnecting hangar so that it can be lowered easily for cleaning. New types of hangars and winch arrangements have been developed especially for fluorescent lamps. With continuous-row lighting it is now possible to lower 32 feet or more of the row at one time for easy cleaning.

Lighting Sales Aided By Training Program

(*Continued from page 42*)

the various meetings were of local origin while others tied in with similar work being carried out nationally. The fact that "light saves sight" was used, with the addition that the engineering services of the company were ready at all times to assist the contractor in providing the proper footcandles to save sight. Enough footcandles to do the work was stressed, along with the admonition not to waste light, bringing out that adequate lighting was the profitable angle in the long run. "Proper light to do the work," was the idea stressed.

The contractors were invited to let company engineers help in showing their customers the advertising value of modern lighting and how good lighting attracts attention and becomes a most economical advertising medium. In this category, discussions were held on unusual installations, special purpose installations, all of which in addition to giving proper lighting, attracted favorable attention and publicity to the customer. In the final analysis this made a satisfied customer.

Throughout all the discussions ran a thread of the theme to "Sell Light Instead of Fixtures," and practical demonstrations, which led customers to buy light rather than fixtures, were given.

Probably the most interesting discussions in the meetings held up to now, have been the questions and answers at the open forums.

Handling technical subjects before an audience composed of contractors and electricians, where some have engineering education, others low on engineering but having been thoroughly educated in selling and merchandising, and with many practical men who know what happens when they use the equipment but who are short on theory — speaking before an informal gathering of this type requires a high knowledge of human behavior and psychology.

Typical method of meeting this problem was the opening speech of Mr. Banton:

"I do not come before you as a know-it-all nor as a court of last resort. We have new things coming into our industry every day about which I have to learn and about which you have to learn. I think that if I bring you what knowledge I have and you bring me what knowledge you have, then all of us are going to be in a better position to deal with these new developments in a way which will be mutually advantageous.

"You are contractors, are interested in two things, in giving your best to the customer and in making a profit. We are interested in providing our customers with the means of getting the most out of the power we supply them and so all our interests are so interlocked we can never be separated.

"You want your men here so they can better understand the functions of the lighting equipment. When the building owner asks them questions which arise in his mind, they will be able to give him answers that will reflect credit to your company.

"We must prepare the way in these meetings. I will not promise you to answer every question you ask—indeed, I expect there will be many of them I cannot answer—but I do promise you this—if I can't answer the question, I will immediately tell you and I promise you I will get the right answer for you."

So the meetings still continue after almost three years on similar lines, with attendances growing constantly and with the work discussed becoming more advanced. Contractors are more and more realizing that the meetings are a means for getting on a common ground to learn more about the needs of the customer and how to supply them.

Mr. Banton's lecturing proclivities are well known. He has lectured before the students at the University of Florida, the Lighting Club of Miami, at the short courses given by the Extension Division of the University of Florida, at Camp Roosevelt, Ocala, and in fifteen or twenty cities throughout the state. He has been called on for numerous other lectures that he has been unable to make due to insufficient time. Last year Mr. Banton made a total of 68 lectures on various lighting subjects. He is a very active member of the Illuminating Engineering Society.

His hobby is Polaroid and polarized light and on this subject he is one of the few capable lecturers in the United States. His lecture covers demonstration of the use of Polaroid glasses to kill glare, the principle of the proposed polaroid auto headlights to prevent accidents, and the use of polaroid screens for photography. The closing part of the lecture demonstrates the use of polaroid lighting.

Results count, and in summing up the results of the three year's work, Mr. Banton said:

"In the light of experience of utilities and contractors in other places, most of the contractors in our territory will never know how much trouble they have missed."

It is the practice of the Tampa Electric Company to furnish a complete lighting engineering service to contractors, building owners, architects and others and even to furnishing complete plans blueprinted ready to use. They do not sell lighting equipment but during the many meetings discuss equipment which meets power factor specifications of the company. This fits in admirably with the scheme of things in promoting cooperation between utility, contractor and customer because the jobber is in a position to supply the contractor approved equipment.

Lighting Progress in the South

A presentation of a few representative lighting installations in the commercial, industrial, and institutional fields by southern lighting engineers.

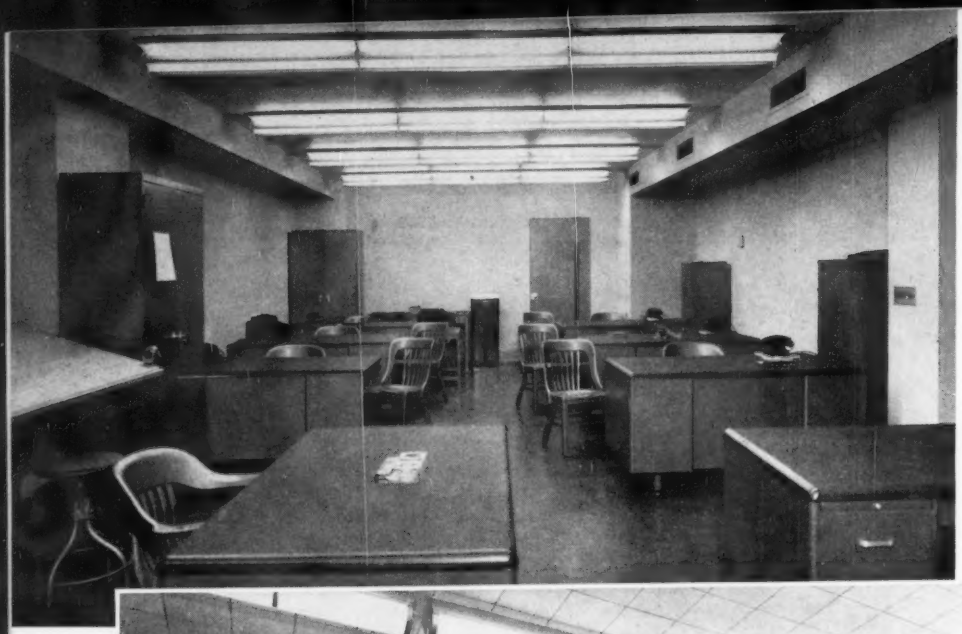
"LIGHTING, that is good lighting, is progressing rapidly today in industry, in business, and in the home. Its value is being recognized as never before and its use is growing at an extraordinary rate," said H. P. J. Steinmetz, chairman of the National Better Light-Better Sight Bureau at a recent meeting of lighting salesmen and engineers. His comments provide a fitting introduction to this series of photos of outstanding lighting installations submitted by lighting engineers throughout the South, photos which indicate that there has been no lagging in lighting development in this region.

"The urgency of the defense program for speed, and more speed, has made adequate, correct lighting for efficiency and accuracy in industry one of the first essentials. In offices and stores have come a corresponding expansion and understanding of the value of proper light for 'seeing' and adequate light for 'selling.' In the home lighting field there is striking evidence that the public desires better lighting.

"The accumulative effect of the continuous promotion of the Better Light-Better Sight movement for the past seven years is just now beginning to awaken the American Public to the importance and real value of adequate and proper lighting.

"We need all our facilities and resourcefulness to keep pace with this growing interest and to take advantage of the opportunities to the fullest extent."

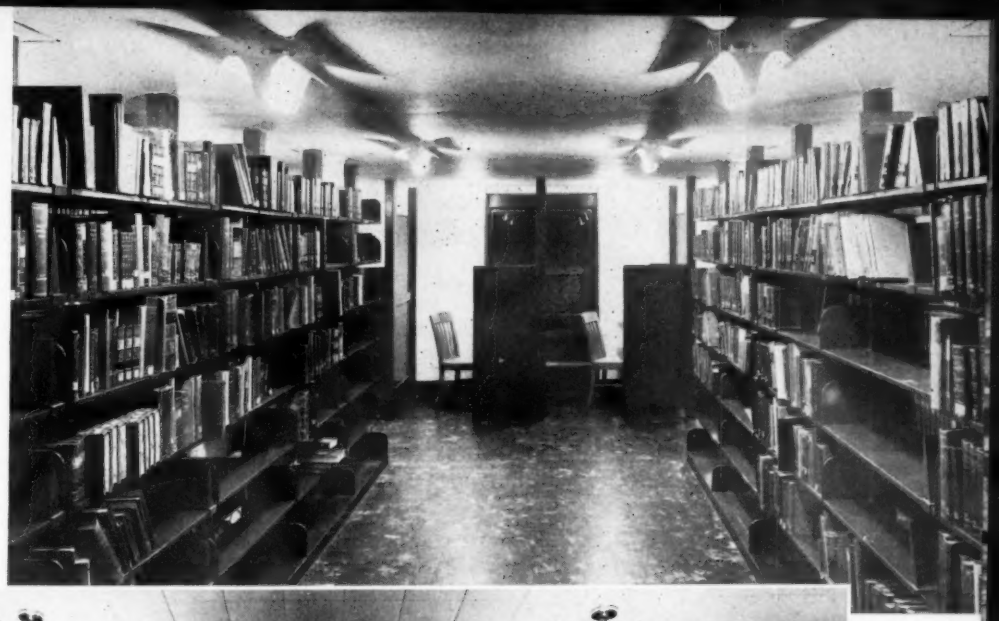
Today's store lighting technique provides for architectural accent as well as effective lighting for selling. A good example is this sales floor of the Shaw Jewelry Co., Dallas, Texas. Lighting engineers: Brochstein's, Inc., Houston, Texas. Electrical contractor: Paramount Electric Co., Dallas. Fixtures for main lighting: Ruby Lamp Mfg. Co. A bright and inviting atmosphere is attained by skillfully blending 300-watt incandescent downlights with a "daylight" ceiling illuminated by double rows of daylight fluorescent high voltage tubing concealed in ceiling recesses. General illumination: 26 footcandles; wall cases, 60; show cases, 85; and display windows 250 to 500.



The new office building of the Electric Power Board of Chattanooga, opened recently, contains a complete version of modern lighting engineering. Every popularly accepted type of fixture has been incorporated in the lighting facilities. The watch word throughout the installation was a "minimum of fifty footcandles in all working areas." In some locations in the building lighting levels are as high as sixty-five footcandles. In addition to commercial and industrial fixtures, use was made in various locations of residential, auditorium, and sign lighting, as well as such miscellaneous types as cove, floodlighting, exit, mirrow, and stage lights. Lighting by Board's lighting division.

The fixtures in the upper photo were made by Curtis; fixtures in center and lower photo are Westinghouse units. Fluorescent lighting was utilized to advantage on two entire floors. All fluorescent lighting fixtures have high power factor ballast equipment, are glass enclosed or well shielded, and are of the most modern design. All other floors are lighted by means of a variety of indirect incandescent fixtures. Among the manufacturers' fixtures represented are Curtis, Westinghouse, Goodrich, Guth, Wheeler, Art Metal, Century, Lincoln, Banks, Holophane, Kirt-Versen, Benjamin, Belson, Wakefield, Daybrite, and Virden. This variety provides an ideal fixture display.

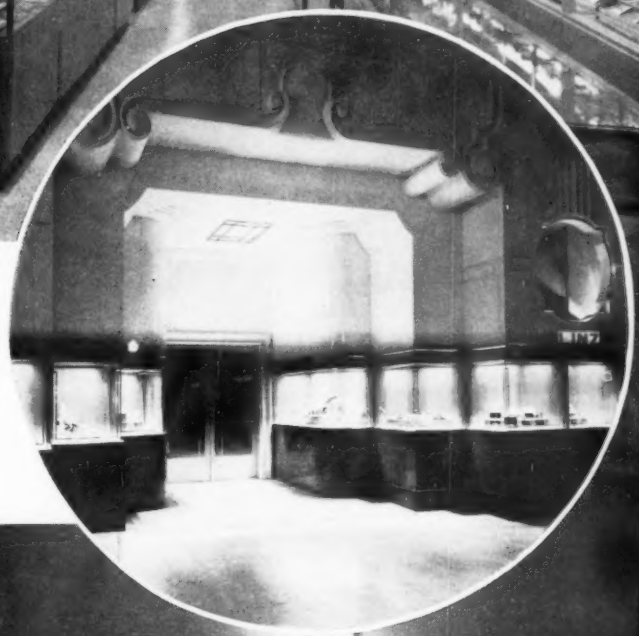
The new Howard-Tilton Memorial Library of Tulane University, New Orleans, La., recently completed at a cost of approximately $750,000, is one of the most modern libraries in the country. The design and specifications for the building were prepared by Moise H. Goldstein and associates, architects. Consulting electrical engineer: James M. Todd; lighting engineer: W. L. Argus, New Orleans Public Service, Inc. The building is rectangular in shape, approximately 200 feet by 112 feet. There are three floors of general and specific reading rooms, and seven levels of stack area. The various reading rooms are illuminated with semi-indirect incandescent fixtures providing 25 to 35 fc.



The photo at top shows a typical stack area. 15 to 25 footcandles are provided on the vertical plane in front of stacks by 100-watt Goodrich Stocklite units on seven foot centers. In the carrels shown in the background, 35 footcandles on desk tops are obtained from 150-watt Holophane units. The center photo shows the Social Science Reading Room. The dimensions of this room are approximately 68 feet by 35 feet with a ceiling height of 11½ feet. Thirty footcandles of illumination are provided by 17 500-watt Westinghouse units. Below: the Tilton Memorial Reading Room. In this room, 17 1000-watt Miller units provide an average illumination of 35 footcandles.

The make-up room of the Times-Picayune Publishing Co., New Orleans, La. Lighting designed by Raymond Frischhertz, chief electrical engineer of Times-Picayune, in collaboration with John D. Havercamp, industrial sales engineer, New Orleans Public Service, Inc. The new lighting is supplied by 24 Mitchell RLM type fixtures, each equipped with two 100-watt white fluorescent lamps, spaced 8 feet by 8 feet and mounted at height of 12 feet. Lighting intensity is between 60 and 70 footcandles.

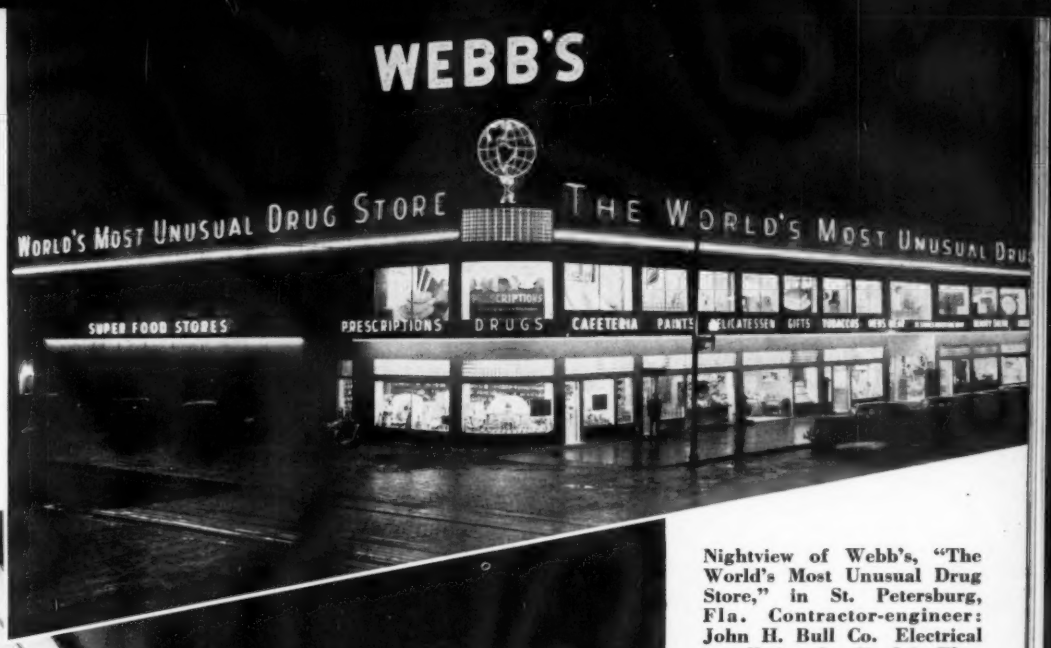
Rosenbaum's Department Store in Cumberland, Md. Lighting recommendations made by Potomac Edison Co. Lighting Department. Electrical contractors: Sterling Electric Co., Cumberland. Light equipment furnished by Garden City Plating and Mfg. Co. Lighting system consists of four continuous rows of fluorescent mounted on the ceiling and spaced 16 feet apart, supplemented by cove, wall case and show case lamps. Average maintained footcandles, 54.



Linz Brothers, Jewelers, Dallas, Texas. Architect: Lang & Witchell, Dallas. Lighting engineers of the Dallas Power and Light Co. cooperated with the architect and contractor in designing and installing the lighting. Electrical contractor: Rob Roy Electric Co., Dallas. Both incandescent fixtures shown above and fluorescent below were furnished by Solar. The first floor, above, is flooded most effectively with incandescent downlighting from lensed reflectors recessed in ceiling. Light on counters varies from 75 to 100 footcandles. Second floor lighting, shown below, includes continuous double-lamp fluorescent units with smart glass louvres.

Weave room lighting of Macon Textiles Inc., Macon, Ga. Architect: J. E. Sirrine & Co., Greenville, S. C. Miller continuous fluorescent troffer lighting was used, one 40-watt lamp in each four foot section. Fixture sections run end to end in continuous rows which are 5′4″ apart; outside rows are 2′8″ from walls. Entire area (106′ x 103′ with 9′ ceiling) is lighted by 20 rows recessed in accoustical ceiling. Each row is made up of 25 4-foot troffer sections. Illumination: 60 footcandles.

Directly below: the drafting room of Hoke Smith, architect, Dallas, Texas. Dallas Power & Light Co. lighting engineers collaborated in the design and installation of the lighting equipment. Fixtures were furnished by Curtis. Supplementing, and at night replacing, the desirable quality of "north light" daylight which comes through the large windows, a continuous double row of fluorescent lamps extends the entire length of the room directly above drafting tables. Lighting intensity is approximately 45 footcandles. Glare is minimized by circular louvres along the tubes.



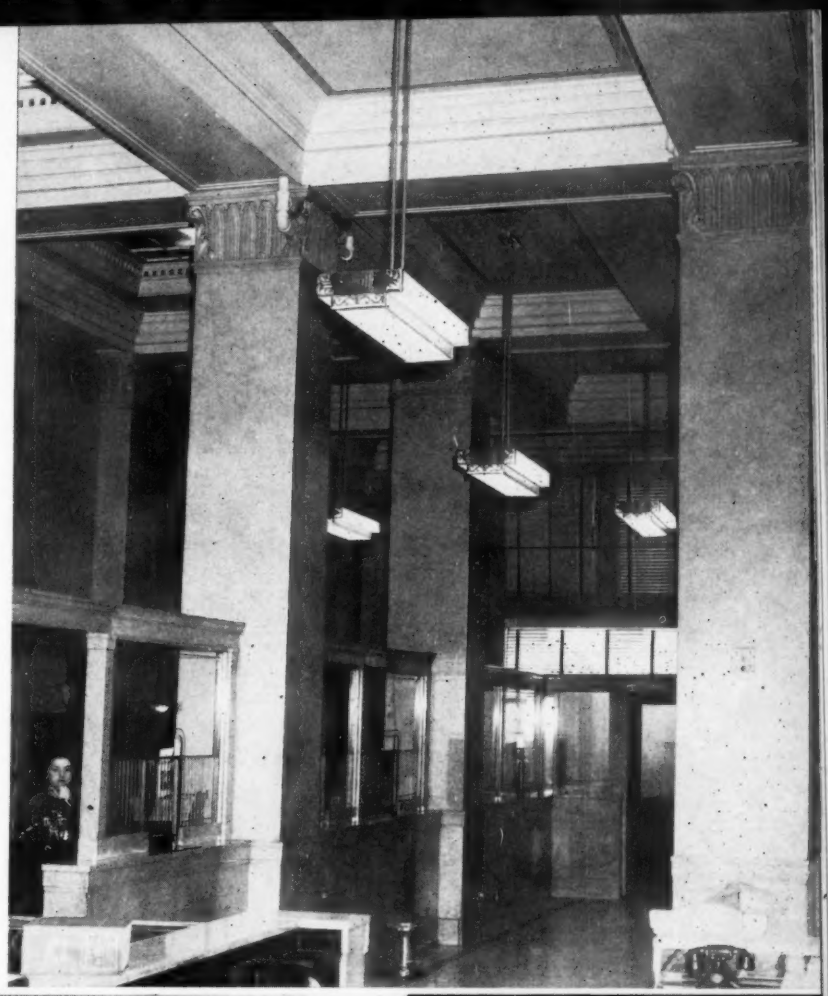
Nightview of Webb's, "The World's Most Unusual Drug Store," in St. Petersburg, Fla. Contractor-engineer: John H. Bull Co. Electrical installation by Sinclair Electric Co. Lighting engineer: Gordon Kent, Florida Power Corp. The porcelain enameled sign letters were furnished by the Chattanooga Stamping and Enameling Company. Ace Signs, Inc., installed all sign work. The roof sign, "Webb's," is 16 feet above the roof. Six-foot channel type letters are illuminated with a double row of red outside and white tubing inside. The illuminated world is 10 feet high. The porcelain enamel box-type letters extending along each side are 58 inches high. Over 8,000 pounds of porcelain enamel letters were used and 3,500 feet of fluorescent sign tubing. Interior light-levels range between 45 and 50 footcandles. A special fixture, designed and manufactured in St. Petersburg, was used for interior general illumination. The unit consists of three concentric louvres and will accommodate 300 or 500 watt incandescent lamp. It combines good shielding with downlighting.

At right: Gulf Oil Company, Atlanta, Ga. Architect, F. C. Houpt, Atlanta. Lighting engineer: R. W. Keiser. The photo does not show up to full advantage the vividness of this splendid outdoor installation. Two rows of 25MM cold cathode "yellow-white" fluorescent tubes are mounted on the outside of the building. Under canopy are two fluorescent fixtures using 4 40-watt type F lamps activated by a No. 999 power unit supplied by National Transformer Corp., who also supplied the cold cathode tubes and amplifiers. Type F lamps also used inside.

Above: Merchandise sales room of the Potomac Edison Company, Hagerstown, Md. Lighting designed by the lighting engineering department of Potomac Edison Co. Electrical contractors: Miller-Liskey Company, of Hagerstown. Illumination is provided by ten indirect luminaires equipped with 750-watt bowl-silvered lamps suspended from ceiling of white tile accoustic board. The ten luminaires are in two rows of five each, spaced on 11½-foot centers. The center bay is illuminated by twenty-four fluorescent units mounted close to the ceiling. Each unit is equipped with two 40-watt 3500° white lamps and cross-wise louvres. An average of 50 footcandles is maintained. Miller supplied the indirect luminaires; Curtis furnished the fluorescent units.

Left: Shoe sales room of Byck Brothers Company, Atlanta, Ga. Architect: George H. Bond. Lighting engineer: T. T. Peake, Georgia Power Company, Atlanta. Electrical contractor: Fulton Brothers Electric Co., Atlanta. This installation features a well-designed combination of incandescent and fluorescent lighting. The average lighting intensity is approximately 30 footcandles. All lighting fixtures except the trough and soffit were furnished by Pittsburgh Reflector Company. The trough and soffit was manufactured by Summerour & Devine, Inc. The downlights consist of 300-watt lamps in recessed units with concentric louvres and plastic ring. Trough contains 9 40-watt type F fluorescent lamps.

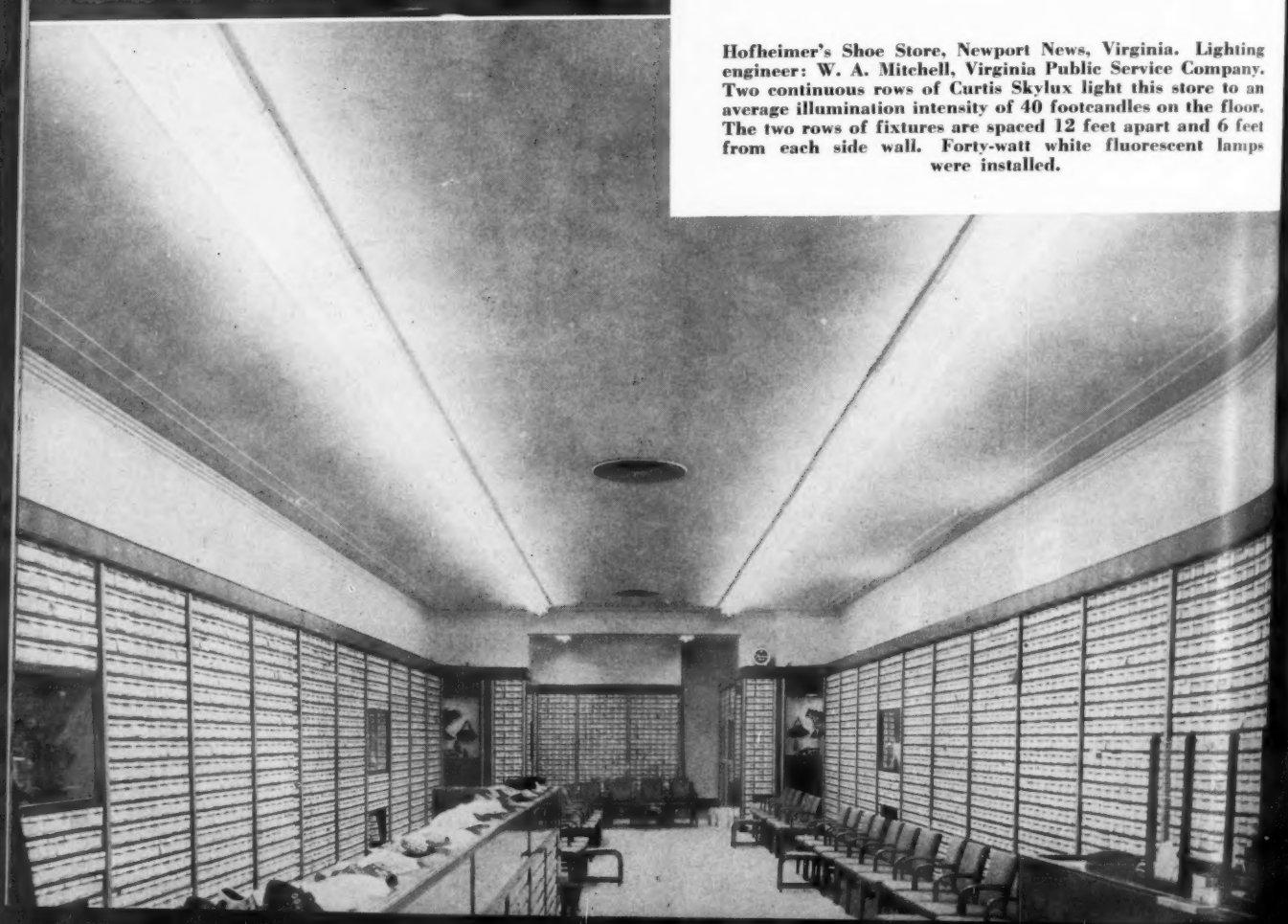
Right: The First National Bank of Vicksburg, Mississippi. Lighting engineer: Chatham H. Reed, Mississippi Power and Light Co. Electrical contractor: J. M. Fried Company, Vicksburg. General illumination in this bank was increased from an average of three footcandles to over 35. With local lighting on tellers' desk, the intensity is 40 footcandles. Fourteen fixtures, each containing six 40-watt white fluorescent lamps were installed on from 15 to 20 foot centers. The fixtures were supplied by Ruby. Irregular sized ceiling bays and the necessity of installing fixtures which would harmonize with the furniture and architecture were among the problems confronted in designing this installation. Illumination before the new lighting was installed averaged 3 footcandles.



Below: The Rosemont Gardens, Montgomery, Alabama. Lighting engineer: D. D. Black, Alabama Power Company, Montgomery, Alabama. Incandescent lighting fixtures supplied by Holophane. The installation consists of a flush Controlens system for direct lighting combined with a continuous, indirect cove containing 22 white 40-watt fluorescent lamps. Two rows of the Controlens units on 6½ foot by 13½ foot centers were installed, each containing a 200-watt incandescent lamp. A partially recessed air conditioning duct runs down the center of the room, effectively breaking up the flat ceiling and providing an excellent location for the cove. The strong directional light of the incandescent units brings out the highlights and shades of the blossoms. Average illumination is approximately 30 footcandles.

Thrift Auto Store, Alexandria, Virginia. Lighting engineer: W. B. Shenk, Virginia Public Service Company. Electrical contractor: Walter C. Davis. The lighting intensity in this store ranges from 50 to 60 footcandles. Guth Excelux fixtures were used, each equipped with four 40-watt white fluorescent lamps. Fixtures were installed on 8 foot by 8 foot centers.

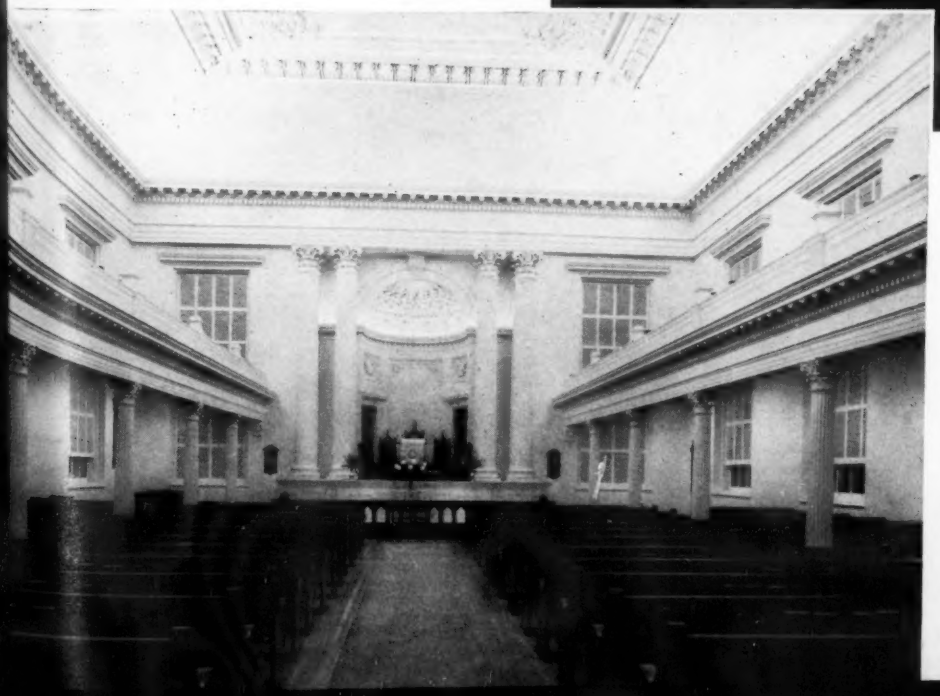
Hofheimer's Shoe Store, Newport News, Virginia. Lighting engineer: W. A. Mitchell, Virginia Public Service Company. Two continuous rows of Curtis Skylux light this store to an average illumination intensity of 40 footcandles on the floor. The two rows of fixtures are spaced 12 feet apart and 6 feet from each side wall. Forty-watt white fluorescent lamps were installed.



Left and below: The Electric Fountain in Joel Hurt Memorial Park, Atlanta, Georgia. Landscape architect: William C. Pauley, Atlanta. Lighting engineer: E. T. Austin, General Electric Company, Atlanta. General Electric Company supplied the electrical equipment. This fountain is now one of Atlanta's feature attractions. Located in a small park in the heart of the city, it attracts hundreds of visitors every evening. In contiuous operation, it repeats a complete cycle of lighting and water effects every six minutes. In each complete operating cycle there are 25 different water effects and 15 lighting effects.

The photo above shows the arrangement of water nozzles and floodlights. The water nozzles include one 11½ foot ring with 140 jets; one 7½ foot ring with eight 60° spray nozzles; one 7 foot ring with 8 fire nozzles; one 28 inch ring with 8 fire nozzles; and six 22 inch rings, each with 35 jets. Control for the water effects is supplied by 8 thrustor operated electric valves. Floodlights include 31 units, ranging from 400 to 1500 watts each, controlled by thyratrons. Total load including water pumps is approximately 62 kilowatts.

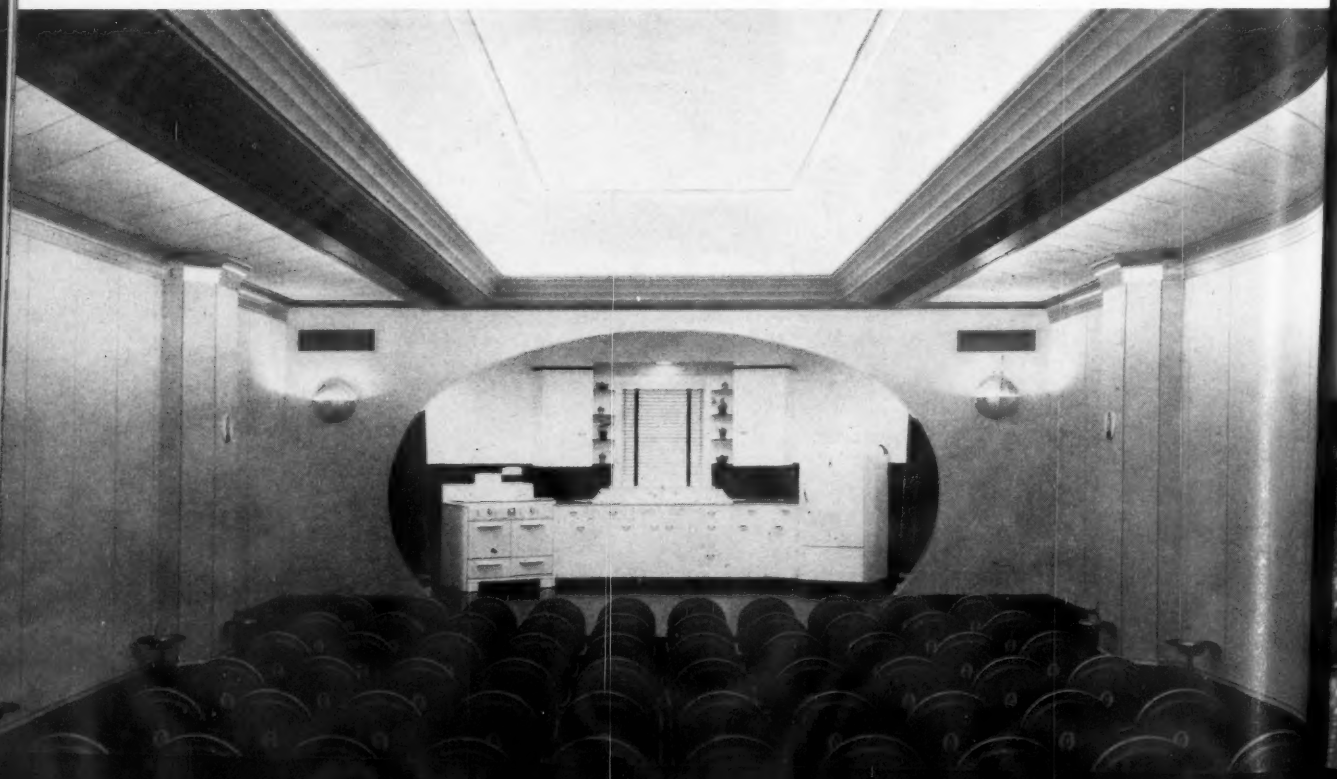
Below: Trinity Methodist Church, Charleston, S. C. Lighting engineer: Harry Curtis, South Carolina Power Company. Principal lighting equipment was furnished by Pittsburgh. The lighting of this church auditorium is one of the outstanding jobs of its kind in the South. So even, soft, and well-diffused is the illumination as shown in the photo below that one might think at first glance that the photograph was made with daylight lighting. Before the new lighting was installed last fall, this church was lighted almost entirely by gas.

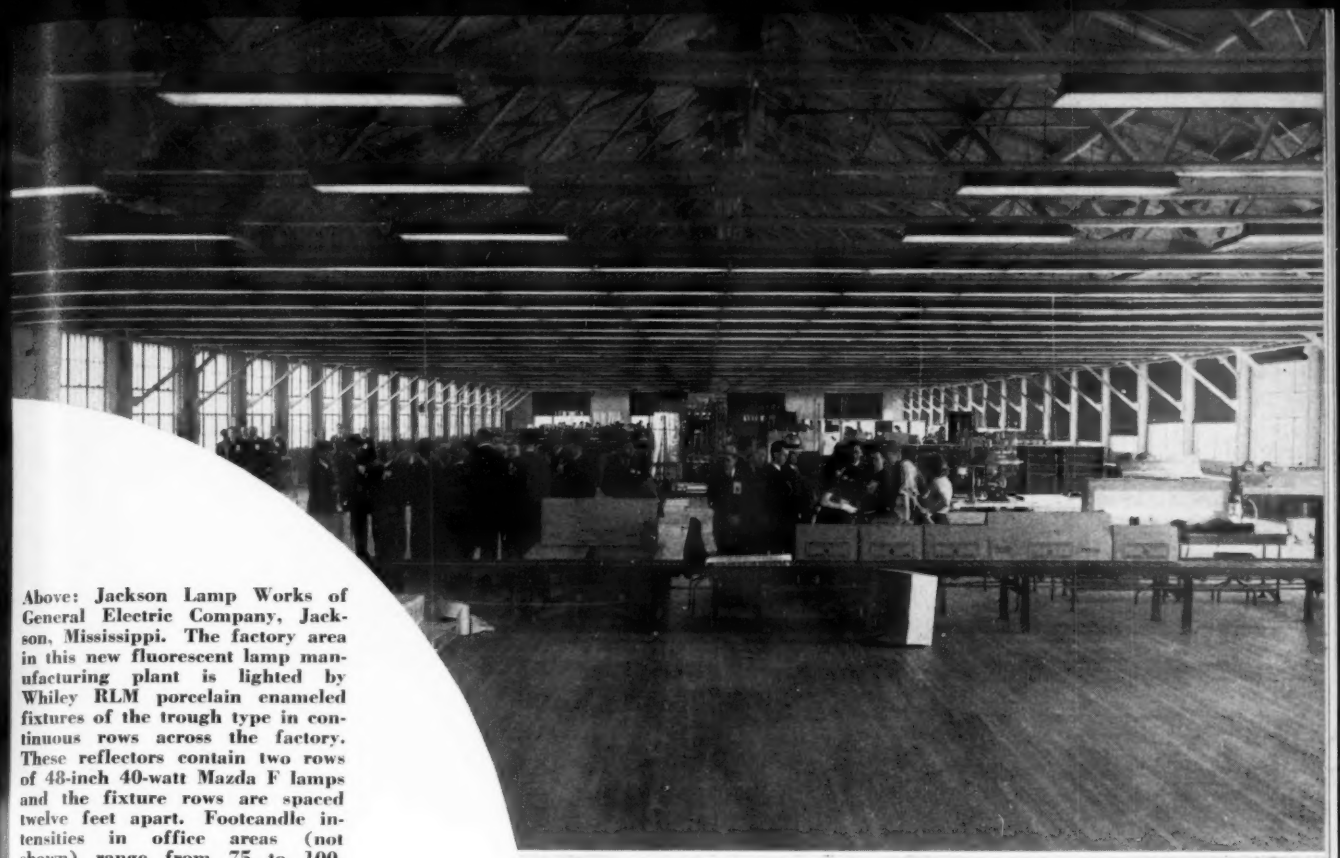


The general illumination in the church is now supplied from sixty 200-watt incandescent lamps located in the cove above the balcony and from sixteen 200-watt incandescent lamps recessed beneath the balcony. In addition, and for decorative effect, eighteen 15-watt gold fluorescent lamps were installed in the cove in the alcove behind the pulpit. The main cove reflectors were evenly spaced in the coves along each side of the auditorium. No reflectors were placed in the coves at either end of the auditorium because of their inaccessibility for maintenance. The fixtures under the balcony, flush mounted with glass mountels, were spaced ten feet apart at a mounting height of eleven feet. The resultant intensity averages 21 fc.

Above: Kroskin's Naval and Civilian Outfitters, Inc., Norfolk, Virginia. Lighting engineer: A. E. Dunn, Virginia Electric and Power Company. From a lighting point of view Kroskin's new store, shown here, represents a considerable improvement over their previous location where the average lighting intensity was only 6 footcandles. Approximately 40 footcandles are provided in the new store by the six rows of Curtis Skylux fixtures. Each row consists of three fixtures containing six 40-watt white fluorescent lamps each. A continuous row of 40-watt fluorescent lamps are used behind the extended cornice bar along the entire length of the store and across the rear. The cornice bar fixtures were supplied by the Fluorescent Light Co., Inc., of Norfolk.

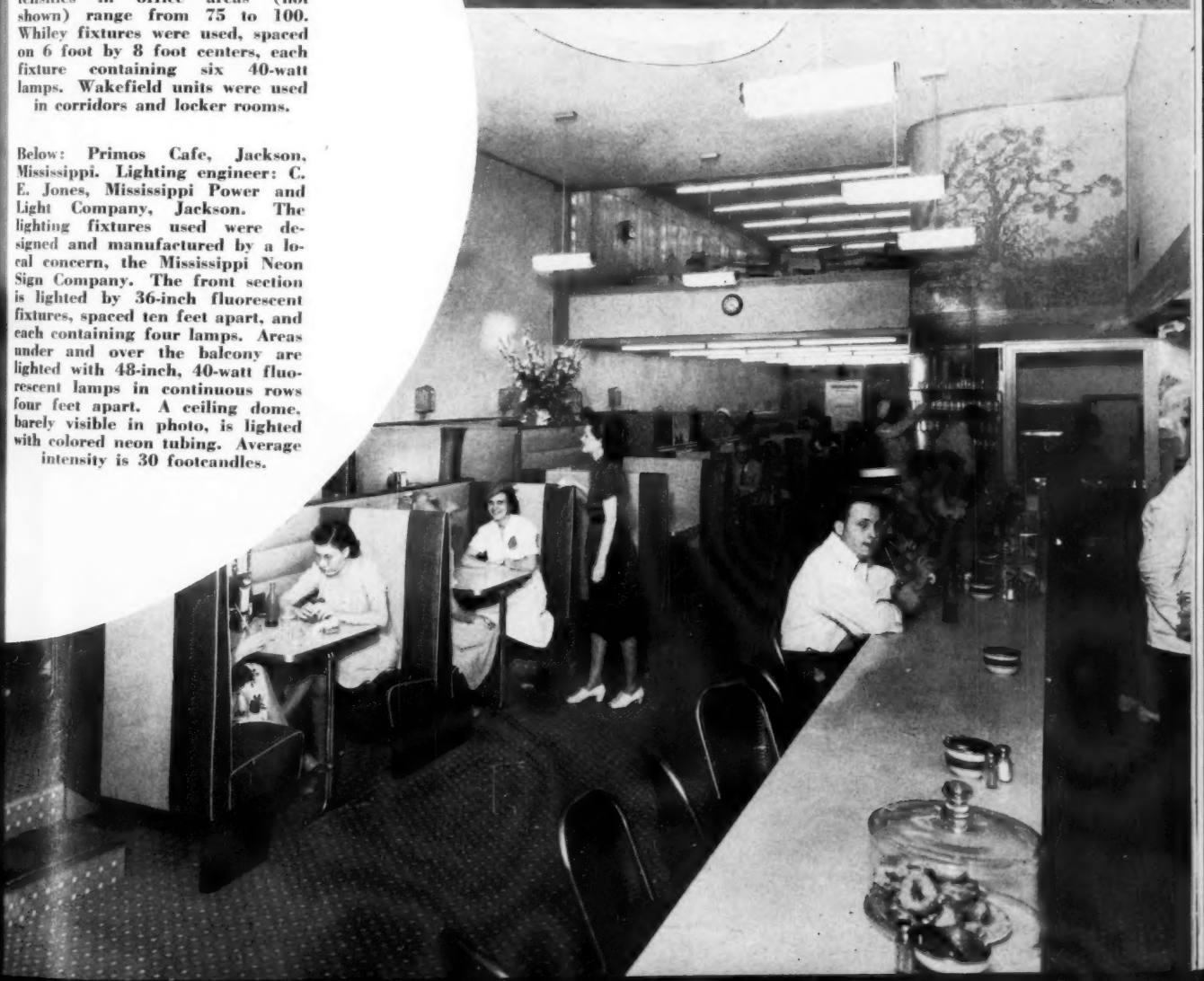
Below: Atlanta Gas Light Company Small Auditorium and Kitchen Display, Atlanta, Georgia. Architect: R. Kennon Perry, Atlanta. Lighting engineer: T. T. Peake, Georgia Power Company. Electrical contractor: Dixie Electric Company, Atlanta. The fluorescent lighting fixtures were supplied by Curtis. The principal lighting for this attractive meeting room is furnished by the indirect fluorescent lighting mounted in the suspended trough which takes the form of a rectangle, the front end not being visible in the photograph. Three rows of 40-watt white fluorescent lamps supply a soft average intensity of 15 footcandles. Two wall bracket fixtures, one on each side of the stage, are lamped with 300-watt incandescent lamps. Ten 200-watt incandescent lamps in show window type reflectors serve as stage footlights.





Above: Jackson Lamp Works of General Electric Company, Jackson, Mississippi. The factory area in this new fluorescent lamp manufacturing plant is lighted by Whiley RLM porcelain enameled fixtures of the trough type in continuous rows across the factory. These reflectors contain two rows of 48-inch 40-watt Mazda F lamps and the fixture rows are spaced twelve feet apart. Footcandle intensities in office areas (not shown) range from 75 to 100. Whiley fixtures were used, spaced on 6 foot by 8 foot centers, each fixture containing six 40-watt lamps. Wakefield units were used in corridors and locker rooms.

Below: Primos Cafe, Jackson, Mississippi. Lighting engineer: C. E. Jones, Mississippi Power and Light Company, Jackson. The lighting fixtures used were designed and manufactured by a local concern, the Mississippi Neon Sign Company. The front section is lighted by 36-inch fluorescent fixtures, spaced ten feet apart, and each containing four lamps. Areas under and over the balcony are lighted with 48-inch, 40-watt fluorescent lamps in continuous rows four feet apart. A ceiling dome, barely visible in photo, is lighted with colored neon tubing. Average intensity is 30 footcandles.



Formal opening of the East Tennessee Light and Power Company's general office building in Bristol brought hundreds of visitors. The splendid lighting installation is one of the new office building's outstanding features. Above, one of the general office rooms lighted by Guth fluorescent troffer fixtures. 65 footcandles are provided at desk top level. Right center: office of Secretary and Treasurer, typical of executive offices on second floor. Below: the spacious main display floor lighted by Guth recessed troffer fluorescent fixtures. Average lighting intensity is 75 footcandles.

The impressive skyline of Houston, Texas, progressive industrial metropolis of the Southwest.

Houston Contractors Are Hosts To 40th Annual Convention

GATHERING for one of the most important conventions in its history, the National Electrical Contractors' Association will celebrate its fortieth anniversary in Houston, Texas, October 6, 7 and 8. Convention headquarters will be at the Rice Hotel.

Five business sessions will be conducted during the three-day convention, each one filled with discussion of important, timely topics of particular interest to every contractor—many of the addresses will deal with the unusual conditions that will confront many contractors in the coming year.

To be heard at the opening session will be an address by NECA's president, Robert J. McChesney, with the subject "Save Electrical Work for the Electrical Industry." The report of the Secretary will be presented by Laurence W. Davis, general manager of NECA. "National Defense and Priorities" will be discussed at this session by a representative of OPM. The concluding address of the first morning session will be made by George R. Conover, manager of public relations for the Philadelphia Electric Co., who will talk on "The Electric Utility and the Contractor."

A special session will be conducted Monday afternoon for IBEW Employers. E. C. Carlson, chairman of NECA's Labor Relations Committee will address the group. Other speakers at this session will include: D. W. Tracy, assistant secretary of labor, Washington; W. L. Ingram, vice-president, I.B.E.W., Fort Worth; and L. K. Comstock, chairman of the Council on Industrial Relations, New York.

The 570-foot San Jacinto Memorial Shaft at San Jacinto Battleground near Houston, marking the spot where the Texas Army under General Sam Houston defeated the Mexicans and won independence for Texas.

The problem of selling will occupy most of the speakers at the Tuesday morning session. Opening this session with a talk on sales development will be D. B. Clayton, chairman of NECA's Sales Development Committee. "Where to Sell" will be the subject of a talk by G. D. Mateer, author of the NECA Sales Development Manual. Other addresses to be presented at this session will be: "Industry Statistics," by A. Lincoln Bush, chairman of NECA Statistical Committee, New York; "The Place of Statistics in the Contractor's Business," by J. Walter Collins, secretary of Electrical Contractors' Association, Chicago; and "The National Apprenticeship Standards," by E. Z. Herzberg, chairman of NECA Apprentice Training Committee.

At the Wednesday morning session, George Andrae will discuss "Simplification of Wires and Cables"; George Patterson will talk on "Estimating and Cost Data"; and Col. O. R. McGuire will speak on legal problems.

Miami Inspectors' Meeting To Consider Code Changes

THE increasing pace of the national defense effort is bringing about many changes that will directly affect the activities of the electrical inspectors. Rapidly expanding communities in areas not having regular inspection service; changes in types of material entering into the construction of electrical wiring devices and fixtures; and the increased duty imposed upon electrical equipment and circuits as the result of expansion in many industrial plants are typical of the changes that are taking place which concern electrical inspectors.

Particular importance, therefore, will be attached to the coming meeting of the Southern Section, International Association of Electrical Inspectors, to be held in Miami on September 29, 30 and October 1, with headquarters at the McAllister Hotel.

Every inspector should endeavor to attend this meeting. For those who are not certain that their city management will send them, here are several urgent reasons which they may present to their immediate supervisors: (1) this meeting will be the last opportunity available for submitting and discussing proposed Code changes; (2) it provides an opportunity to obtain standardization and uniform practices during the national defense emergency; (3) it provides a splendid opportunity to get a better understanding of the existing Code; and (4) city management should take an active interest in these meetings by sending their inspectors for if they are not sufficiently interested to send their inspectors, they are hardly in a position to criticize the Code.

Frank G. Camus, president of the Southern Section, urges every electrical inspector to attend this important meeting.

A considerable part of this three-day meeting will be devoted to Code discussion. A "Panel of Discussion Leaders" will be present representing some of the outstanding Code authorities. Among those on the Panel are: Arthur L. Abbott, L. F. Adams, T. W. Bowry, M. M. Brandon, Frank G. Camus, N. E. Cannady, J. G. Fisher, C. M. Jones, E. C. Knox, H. N. Pye, B. Z. Segall, V. H. Tousley, H. H. Weber, and Geo. Welman.

Only a few addresses will be presented. Arthur L. Abbott will talk to the group Monday afternoon on the National Electrical Code. "Is Its Serviceability Fully Appreciated?" will be the theme of his talk. "Power Factor As It Affects Electrical Inspection," will be the title of an address by Harper Davidson. Others who will address the meeting Monday will be: G. E. Kimball, president, IAEI; Frank G. Camus, president, Southern Section, IAEI; and Victor H. Tousley, secretary, IAEI.

Principal speakers during Tuesday's sessions will be Alvah Small, president of Underwriters' Laboratories, Inc., and E. G. Romeiser, who will present a moving picture dealing with the use of porcelain insulation.

MANUFACTURERS' News

Westinghouse Constructing $1,800,000 Glass Factory

Construction of a glass factory at Fairmont, W. Va., at a cost of $1,800,000, to employ 200 Fairmont workers, was announced recently by David S. Youngholm, vice-president of the Westinghouse Electric and Manufacturing Company.

Eventually the new industry will employ 400 men and women. Its operation will mark the entry of Westinghouse into a new field. It will produce glass tubing for all Westinghouse fluorescent lamps and also the small glass stems for incandescent lamps.

The glass factory will stand close to the new Fairmont fluorescent lamp plant, on the 90-acre tract recently acquired by Westinghouse on the Monongahela River.

The building will house three large glass-making furnaces in which an estimated 8,000 tons of sand will be melted annually. It will be built of similar materials and in harmony with the lamp plant. Built according to modern factory design and construction methods, the building will have a total length of 355 feet and a width of 240 feet.

Small glass tubing will be produced at the rate of 1,000 feet per minute and the largest tubing at 40 feet per minute. The glass factory will deliver tubes directly to fluorescent-lamp-making machines by means of elevators and an underground tunnel connecting with the lamp factory. Manufacture of miniature bulbs for small lamps, such as automobile headlamps, flashlight and Christmas-tree lamps, will be transferred to Fairmont when the glass plant is in operation. These bulbs are now blown from tubing in Bloomfield, N. J. In 1941 Westinghouse will make approximately 78,000,000 miniature lamps.

Frigidaire Calculators Help Appliance Salesmen

Frigidaire salesmen and dealers are becoming pocket edition Einsteins, thanks to a couple of handy little calculators recently devised for their assistance.

Even the mathematical laggard who hardly knew a square root from a cube of sugar is transformed into a lightning computist. For Frigidaire has designed these little gadgets to supply a quick answer to problems which have long stumped appliance salesmen:

What size water heater does the customer need?

What would be its operating cost?

of an electric range, considering the size of the family?

Both the water heater calculator and the range cost finder are similar in appearance. Each one consists of a celulloid cover and a slide which fits into it. The unit is about seven inches long and 3½ wide.

The water heater calculator is somewhat more comprehensive than the range cost finder. It must be used in conjunction with a personal survey form in which is recorded the approximate number of tub and shower baths a family takes; the amount of dish washing, hand washing, shaving and the extent of household and infant laundry.

The survey form gives the approximate number of gallons used for each function and this is totaled. Then the salesman pulls the slide from the calculator until that total figure appears at an aperture in the envelope. Corresponding windows reveal which model heater is needed. By means of a little table printed on the calculator the salesman is enabled to arrive at the approximate monthly cost of operating the heater.

The range cost finder is comparatively simple. Manipulation of the card reveals, through apertures on one side of the celulloid covering, the monthly cost of cooking on a Frigidaire electric range, depending on the number of persons in the family and the local electric cooking rate. The reverse side shows the basic and plus features of every model range.

G-E Water Heater Specials

Four new galvanized tank special electric water heaters, in 30-, 40-, and 50-gallon sizes, have been announced by the General Electric appliance and merchandise department, Bridgeport, Conn. The new heaters will supplement the special 30-gallon water heater, having a single unit, announced last year. The new 30-gallon heater, model G-302B, has twin units—600 watts for the lower and 1,000 watts for the upper units, as has the 40-gallon heater, model G-402B. The latter has 750-watt lower unit and a 1,250-watt upper unit.

The new model G-521B, of 50-gallon capacity, has a single lower unit, rated 2,500-watts, while the model G-522B has a 1,000-watt lower unit and a 1,500-watt upper unit.

The new water heaters are round in shape, with sealed fast heating Calrod units immersed in water, heating it directly. An accurate adjustable automatci thermostat controls each of the Calrod units. As hot water is drawn off the tank at the top, an equal amount of cold water enters at the bottom and is distributed by a cold water deflector. Rock wool insulation an average of three inches thick holds heat within the tank and reduces heat losses.

The tank is of heavily galvanized copper bearing steel, with 150-pound working pressure. The steel outer shell is finished in high-gloss, white Glyptal, baked on, with black base. Tank supporters, of pressed steel, as well as the bottom cover and base legs, are all welded together to make a rigid and permanent base.

New Name Announced for Toastswell Manufacturer

The official name of the Utility Electric Company, St. Louis, Mo., manufacturers of Toastswell Toasters and other heating appliances, has been changed to "The Toastswell Company."

The decision effecting this change was brought about by the fact that the brand name—Toastswell—is well-known among the members of the electrical appliance industry and by the general public, whereas the Utility Electric Company is not well known. Also, the change ties the product name and company name more closely together.

This is one of two pocket calculators that are now being made available to Frigidaire dealers and salesmen to enable them to calculate the cost of operating electrical ranges and water heaters. This calculator is the electric cooking cost finder. The card insert is partly withdrawn from the sheath until the local electric cooking rate appears in the upper window. The cost per month for various size families can then be read directly from the other apertures.

Coffee Maker Assortment Offered by Silex Co.

Answering the demand from electrical dealers, The Silex Company has introduced a new All-Electric Coffee Maker assortment, featuring six models for the price of five, at 48.8 per cent profit!

Known as the W-M-E assortment, this special offers the three fastest-selling electric items in the entire Silex line, each a new, popular wide-neck model. The assortment consists of four Bretton 8-cup models, list $5.95; one Saratoga 8-cup model, list $7.95; and one Bretton 6-cup model, offered free, list $5.45.

Each of the six units offered in the assortment includes upper and lower bowl covers, Dippex measuring scoops, and 12 extra cloth strainers. The Saratoga model, trimmed in ivory, also includes a matching serving tray and the exclusive Silex "Anyheet Control," providing 10-heat stove facilities.

This special assortment is available through regular Silex distributors, or direct from The Silex Company, Hartford, Conn.

Adjustable-Speed A-C Drive

Designed especially for industrial applications requiring smoothly adjustable speeds over wide ranges with constant torque, in locations where only a-c supply is available, a new 10-to-1 adjustable-speed drive, which uses a series circuit without the usual exciter, is announced by the Westinghouse Electric & Manufacturing Company. It is available in ratings from 1 to 15 horsepower with a standard speed range of from 175 to 1750 rpm, for 2- or 3-phase operation at 220, 440, 550 volts, on 60-cycle systems.

The new drive has five parts, including control: (1) a single-unit motor-generator set, consisting of a squirrel cage induction motor driving a series a-c generator which supplies operation voltage for (2) a d-c seires motor coupled to the driven load. In parallel with the generator series field is (3) a rheostat which controls the driving motor speed. Control apparatus consists of (4) an across-the-line starter for the squirrel-cage motor, and (5) a pushbutton station.

The new drive is more flexible than the wound-rotor motor and is more efficient than the conventional variable-voltage system because it has no exciter rotational losses. High-torque characteristics of the d-c series motor are combined with the flat-speed properties of the shunt motor to give good speed-torgue characteristics. Optional features include dynamic braking, and inching.

For further information on the series variable voltage a-c drive, write Department 7-N-20, Westinghouse Electric and Manufacturing Company, East Pittsburg, Pa.

"Universal" Announces Range Plans for Fall

The Universal fall range activity will feature a close tie-in with the industry's Modern Kitchen Bureau program, according to Harry Parsons, sales manager of the Universal Range & Water Heater Division.

Universal range sales, according to Mr. Parsons, are the greatest in Universal history and every effort is being exerted to speed up deliveries and insure customers of prompt service. "Naturally," says Mr. Parsons, "the raw material situation has caused hardships among dealers, but we are attempting to give them all the support of which we are capable."

Advertising and promotional material during the fall activity will stress the Multiheat Switch—one of the outstanding features of the '41 line. According to W. J. Cashman, Universal sales promotion manager, advertising will feature the slogan "The Switch is to Multiheat"—which closely ties in with the Modern Kitchen Bureau's slogan "The Switch is to Switches Again."

A special point-of-sale promotional package, co-operative advertising, window banners, and other materials will feature the drive. Special advertisements in trade magazines will announce the trade story in early fall issues.

Simplified Cabinet Sink Line Announced by Youngstown

Production of a new and simplified cabinet sink line is announced by Youngstown Pressed Steel Division, Mullins Manufacturing Corporation, for immediate shipment to distributors and dealers. In consolidating the line to seven models, officers of the company see the chance to make faster deliveries in the field and concentrate factory resources on the most popular units.

In bringing the line down to seven models the buying public indirectly benefits. It is pointed out that the most desirable features of the entire line are to be incorporated in the seven cabinet sinks which have been restyled. Actually, then, the buyer will get a bigger dollar's worth of kitchen convenience.

National advertising by Youngstown Pressed Steel will bring to the attention of the public a new and improved method of washing dishes as well as the added features of the new sink line.

70 Display Ideas Presented In Double-Feature Guide

Seventy illustrative sketches, suggesting a great variety of new treatments for merchandise and other displays, are shown in the Sherman Double-Feature Display Guide, just off the press. Subjects include windows, interior backgrounds and floor displays, adaptable to many different uses.

A number of the suggestions show how new display effects can be secured very simply by the use of a pair of shears and the popular all-around display material—color corrugated.

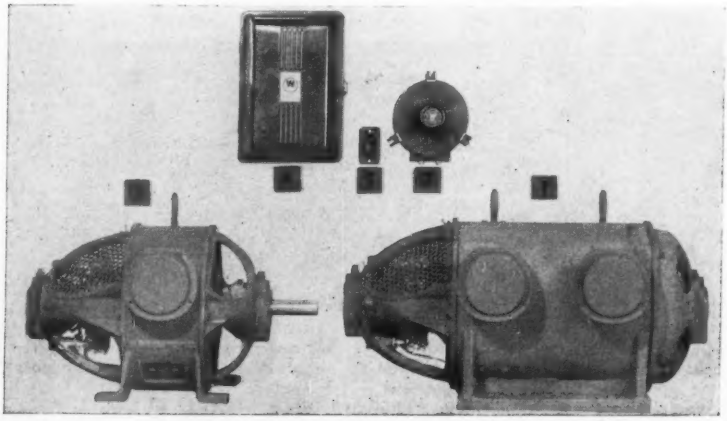
Presenting a wide range of new and seasonal materials for display use, the new Guide has been developed as two separate books, one for Fall use, the other for Winter and Christmas. The complete set is available without charge by writing to: Sherman Paper Products Corporation, Newton Upper Falls, Mass.

Cutler-Hammer Controller

Speed up of production, through reduced fatigue, is the result claimed for the new line of Cutler-Hammer cam operated, mill duty controllers, described in Bulletin 14951. Extreme ease of operation with positive feel of all speed positions is obtained by using an adjustable compression type of star wheel spring.

Available in two speed, three speed, and multi-speed types, the controllers are ideal for mill auxiliaries, crane hoist, bridge, and trolley applications.

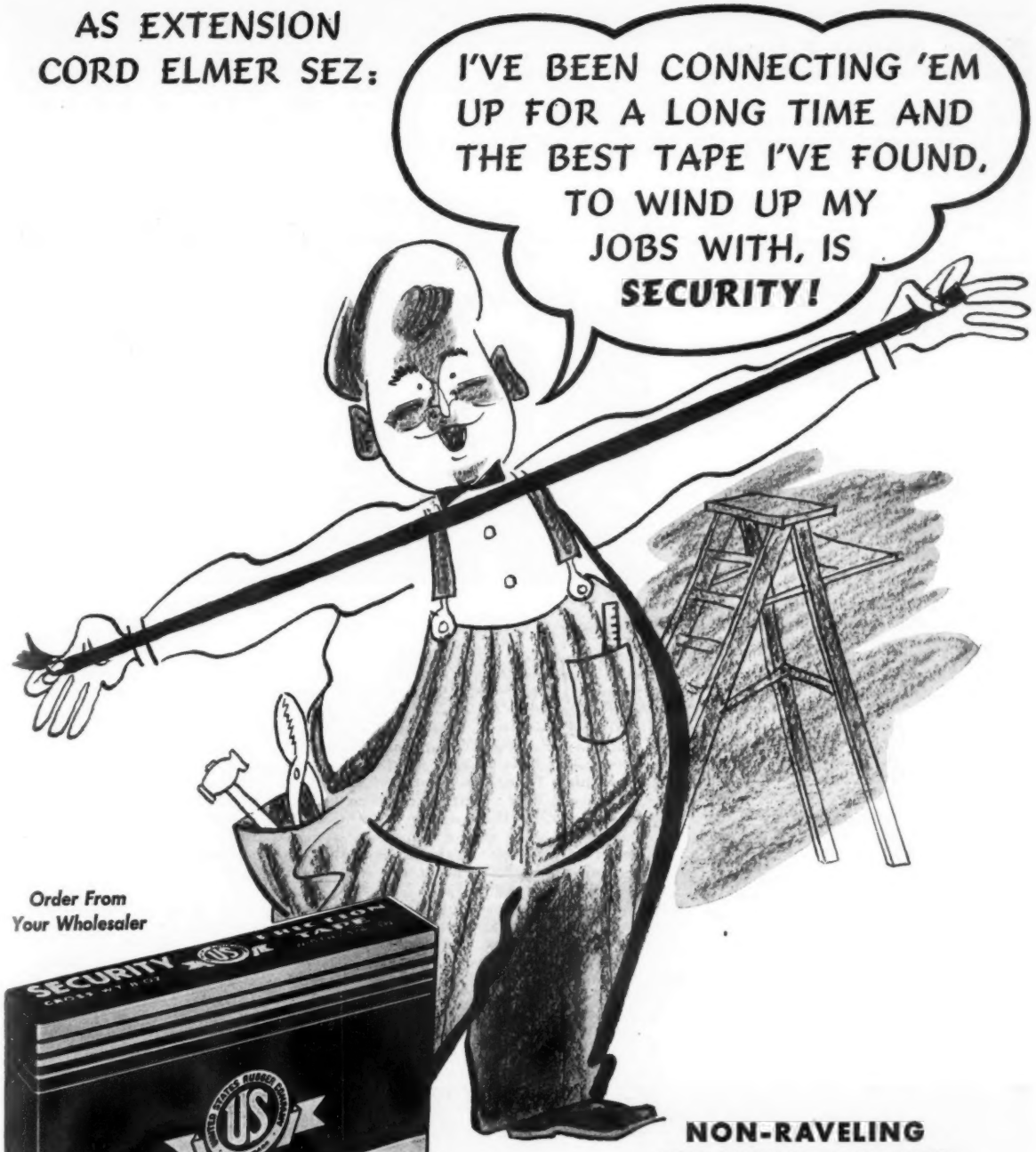
Following are some of the outstanding features: contacts are vertical, double break, silver to silver; cam shaft operates on ball bearings sealed against dust; easily accessible terminal board simplifies installation and service, and a heavy cast case and cover, for their separate or bench board mounting, provided protection from dust and injury.



Component parts of Westinghouse Adjustable Speed A-c Drive

AS EXTENSION CORD ELMER SEZ:

I'VE BEEN CONNECTING 'EM UP FOR A LONG TIME AND THE BEST TAPE I'VE FOUND, TO WIND UP MY JOBS WITH, IS **SECURITY!**



Order From Your Wholesaler

NON-RAVELING
STRAIGHT TEARING
HIGH TENSILE STRENGTH
HIGHLY INSULATING
STRONG ADHESION

UNITED STATES RUBBER COMPANY
ROCKEFELLER CENTER • NEW YORK

ALSO MANUFACTURERS OF U. S. ELECTRICAL WIRES AND CABLES

News About People

W. Homer Reeve, who has been serving as acting sales manager of Easy Washington Machine Corporation, Syracuse, N. Y., has been appointed sales manager of the company, it was announced recently by **H. Paul Nelligan,** president. He assumes complete responsibility for Easy's sales and merchandising activities. Mr. Reeve joined Easy two years ago to direct an extensive dealer development program for the corporation.

* * *

Copperweld Steel Company, of Glassport, Pennsylvania, headed by **S. E Bramer,** president, has announced the appointment of **William J. McIlvane** as general manager of sales of the company's "Copperweld" Division effective August 1st, 1941. Mr. McIlvane succeeds **Robert J. Frank,** who resigned as vice-president in charge of sales on July 31st. Mr. Frank will continue as a vice-president and director of the company.

* * *

Walter V. Gearhart, Atlanta, who has represented several leading electrical manufacturers for a number of years, has been called into military service. Since July 28th, he has been Lieutenant Gearhart, of U. S. Naval Reserve, on active duty in Washington, D. C. His business will continue under the management of **Mrs. Walter V. Gearhart. Harley A. Clause,** is in charge of the Charlotte, N. C., branch, and **Carll W. Strong** is associated with the organization in the Atlanta office.

* * *

An August 10, 1941, **Thomas Waddell Gangloff,** technical manager of the Hazard Insulated Wire Works Division of The Okonite Company, died at the age of 49 after a brief illness.

Following a technical education at Cornell and Lehigh Universities, Mr. Gangloff entered the employ of the Hazard Manufacturing Company, Insulated Wire Division, Wilkes-Barre, Pa., on October 30, 1916, in the chemical laboratory, and some years later was advanced to the position of Chief Chemist.

On January 1, 1928, when The Okonite Company acquired the plant he was appointed technical manager of the Hazard Insulated Wire Division of The Okonite Company, which position he held steadily until his death.

Well-known for his development work in rubber insulations, Mr. Gangloff was active in the affairs of the Rubber section of the American Chemical Society, the National Electrical Manufacturers Association, and the Insulated Power Cable Engineers Association.

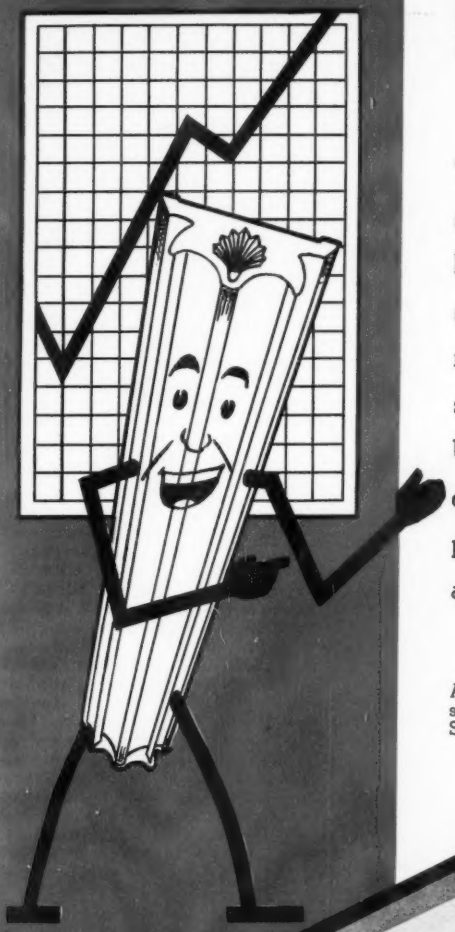
Hotpoint Campaign Winners Go to "Champs' Camp"

The jubilant group of Hotpoint wholesale distributor salesmen and sales managers shown below are the winners in the Hotpoint Company's ten-week "CHAMPIONS CAMPaign," in which 300 distributor salesmen were enrolled.

In the front row, kneeling, third from left, is B. R. Lind, of Graybar Company, Seattle, Washington, National Champion Hotpoint Distributor Salesman. Next to him is L. M. Stratton of Stratton-Warren Company, Memphis, Tennessee, National Champion Hotpoint Distributor Sales Manager. This picture was taken as they visited the Hotpoint Factory, in Chicago, on their way to "Champs' Camp" at Grand Hotel, Mackinac Island. A week at the Camp was the reward to 42 distributor salesmen and five distributor sales managers for their achievement. They were accompanied by Hotpoint district sales managers and field representatives who also won trips.

Above: a group of Hotpoint executives and distributors from the Southeast who were among the winners in the campaign. Left to right are H. K. Dewees, Hotpoint district sales manager, Atlanta; J. T. Nee, Hotpoint range specialist, Atlanta; J. C. Jones, G-E Supply Corp., Atlanta; H. B. Zimmerman, G-E Supply Corp., Jacksonville; R. N. Riley, G-E Supply Corp., Norfolk; A. B. Moore, Harry W. Cameron, Inc., Chattanooga; N. L. Cannon, Graybar Electric Co., Columbia, S. C.; and Grady L. Kirbo, Graybar Electric Co., Birmingham.

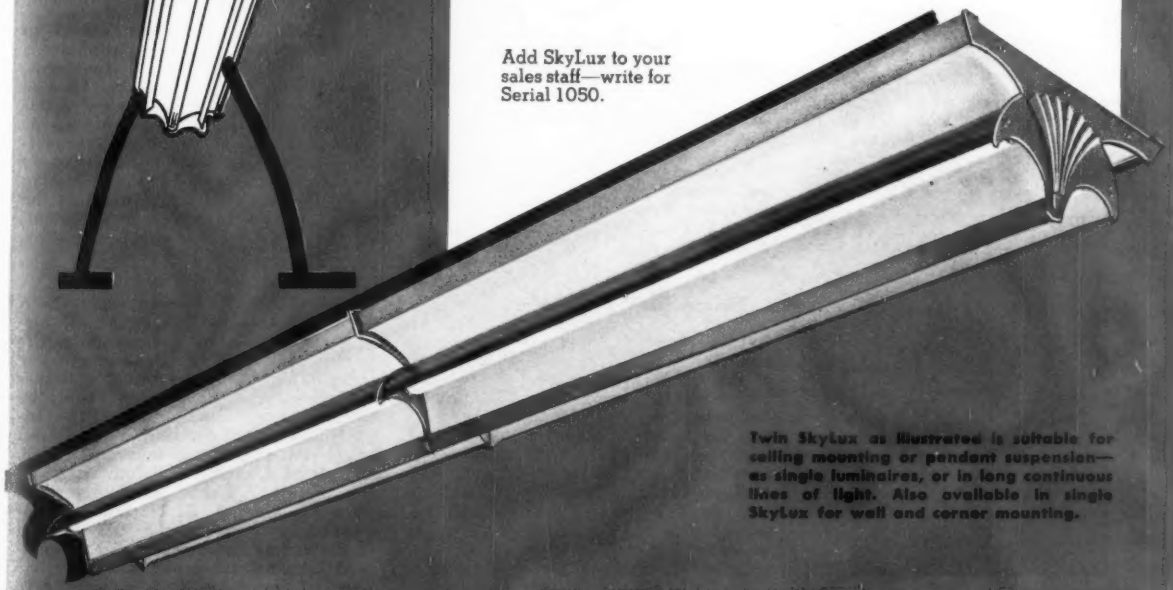
OUR STAR SALESMAN!



SKYLUX *Itself!*

The ever rising graph of CURTIS SKYLUX sales is the best evidence of the splendid lighting job SkyLux does. With every installation SKYLUX, our star salesman, goes right on selling **itself.** No bally-hoo for this salesman. He shows his Fleur-O-Lier and Underwriters' Labels, demonstrates his cool, comfortable high intensities, attractive appearance, low maintenance cost and general adaptability, and the deal is closed.

Add SkyLux to your sales staff—write for Serial 1050.



Twin SkyLux as illustrated is suitable for ceiling mounting or pendant suspension—as single luminaires, or in long continuous lines of light. Also available in single SkyLux for wall and corner mounting.

CURTIS LIGHTING, INC.

6135 W. 65TH STREET . . . CHICAGO

News About People—

Charles T. Lawson is the new general sales manager of Kelvinator, succeeding **Frank R. Pierce,** who was named to the new post of vice-president in charge of sales of both the Kelvinator and Nash Motors Division of the corporation. Mr. Lawson has been prominently identified with the electric appliance business for 20

Charles T. Lawson

years. He came to Kelvinator from Frigidaire, shortly after Mr. Pierce joined Kelvinator in 1939, and was named sales manager of household appliances.

Prior to entering the selling field, Mr. Lawson had an engineering background. He started an engineering career by joining the engineering department of Westinghouse after his graduation from Virginia Polytechnic Institute. In 1917, he transferred to the sales division of Westinghouse and so liked the work that he chose it as his life's work.

* * *

George Whitney, whose appointment as advertising copy chief of the Kelvinator Division of Nash-Kelvinator Corporation is announced by **C. J. Coward,** director of advertising

George Whitney

and sales promotion, has been directly connected with household appliance advertising, promotion and merchandising for more than eleven years, being with Norge for the past eight years, the last two of which he served as advertising manager.

John A. Underwood, long associated with various branches of the housewares and appliance industry, is the new president of Manning, Bowman & Co., according to recent announcement. His election took place at a meeting of the board of directors of the company in Meriden, Conn. Mr. Underwood succeeds **H. B. O'Brien** as president and managing head of the firm.

Mr. Underwood resigned early this year from Montgomery Ward & Co., with whom he had been connected since 1933 as management executive covering both operations and administration. Prior to joining Ward's, he was associated with the Favorite Stove and Range Company of Piqua, Ohio, first as advertising manager, subsequently sales manager, and finally as president of the company. Mr. Underwood was for a number of years managing head of the Great Western Stove Company and Great Western Appliance Company and is a past president of the Stove Manufacturers' Association.

* * *

At a recent board meeting of the Skuttle Sales Company, Detroit, Michigan, **A. L. Evans** was elected president of that company. Mr. Evans was formerly sales manager and treasurer, a position which he held

A. L. Evans

for the past five years. Prior to his association with the Skuttle Company, Mr. Evans was general manager of the Truscon Steel Company, in Walkerville, Ontario, for 22 years.

* * *

Thomas F. Peterson has been appointed director of Electric Cable Engineering & Research of American Steel and Wire Co., subsidiary of the United States Steel Corp. His office will be located at the company's headquarters in Cleveland, where he will be connected with the office of the vice-president in charge of operations.

Born in Brooklyn, N. Y., on December 12, 1902, Mr. Peterson received his education in the public schools of Brooklyn, the Copper Institute of Technology, New York City, and Leland Stanford University, where he received his Master's Degree in Electrical Engineering. His first employment was with the Brooklyn Edison Co. as cable engineer in charge of cable research.

He joined American Steel and Wire Co. in 1927 as cable engineer in the New York office. Later he was promoted to electrical engineer, and in 1931 was transferred to Worchester,

T. F. Peterson

Mass. In January, 1937, he was appointed director of Electrical Cable Works at Worchester, which position he has held until the present time.

* * *

E. H. Alexander has been appointed engineer of the Industrial Control Division of General Electric's Industrial Department, it has been announced by **J. D. Wright,** manager of the company's Industrial Engineering Department. In that capacity, Mr. Alexander will co-operate closely with the manager of the Industrial Control Division.

A native of Windham, New Hampshire, Mr. Alexander was graduated from the University of New Hampshire in 1925 with the degree of B. S. in electrical engineering. In August of that year he entered the employ of General Electric at Schenectady, and in 1928 was transferred to the Industrial General Department.

In 1929, Mr. Alexander went to the G-E district office in Philadelphia as an industrial control specialist. After being there 10 years, he was transferred to the company's Plastics Department in Pittsfield, Mass., as commercial engineer of that department. He returned to Schenectady in 1940 to become the application engineer on electronic control in the Industrial Engineering Department, the position he has held until his recent promotion.

* * *

Two other appointments have been made in General Electric's Industrial Department at Schenectady. Effective July 1, **G. R. Prout,** manager of sales in the department's Industrial Control section since 1939, has been appointed manager of the Industrial Control division. **R. S. Glenn** has been appointed manager sales, Industrial Control division, assisting Mr. Prout. These announcements were made by **J. E. N. Hume,** commercial vice president of General Electric and manager of the company's Industrial department.

As of the same date, according to Mr. Hume, **W. C. Yates** has been relieved of his present duties as manager of the Control and Renewal Parts division of the G-E Industrial department in order to devote more time to his duties as assistant manager of the department. **W. T. Darcy** will continue as manager of sales, Renewal Parts section, reporting to the management of the department.

Grand Champion

A "Grand Champion" horse in the highly trained gaited classes has won his place through proficiency in two general classifications—conformation and performance. We all know about "performance" whether it concerns horses or Pole Line Hardware, but conformation is something vastly different, though closely related.

With horses it is the shape of the head, the contour of body and legs, the placement and carriage of ears, mane and tail. A horse is *born* with it or without it. In hardware it is "design", and must be *put into* the article by someone who *knows*.

Hubbard 4-11-44 Wireholders have "clicked with judges" all over the world. Their design has been approved, tested and checked by "performance" for many years and under all conditions.

If you have not yet used the BLUE RIBBON 4-11-44 Hubbard Wireholder, you are in for a pleasant surprise. Write for a sample to look over and test—and "judge" for yourself.

HUBBARD AND COMPANY
PITTSBURGH . . . OAKLAND CALIFORNIA . . . CHICAGO

Write for Sample to
HUBBARD AND COMPANY
Advertising Department
6301 Butler St. Pittsburgh, Pa.

ANG THE LOAD ON HUBBARD HARDWARE"

NEWS of the INDUSTRY

Merchandising Wallop in Modern Kitchen Bureau's Fall Range Campaign

TWENTY-EIGHT thousand kits and plan books have been mailed out to electrical dealers and utilities announcing the Modern Kitchen Bureau's fall electric range campaign and an increase in its record year of national advertising.

Backed up by an advertising campaign running in five national magazines, the Bureau's fall promotion is a direct merchandising drive under the theme of "The Switch is *On*—Cooking's Going Electric—Change *Now* to a Modern Electric Range!" The Bureau emphasizes the fact that this is a direct tie in with the national advertising which has been running throughout this year under the theme of, "The Switch is to Switches Again."

A new ad in color was added which uses the fall promotion theme as its headline and makes a direct bid for business. The Bureau's national advertising has been attracting wide attention because of its exclusive manner of presenting the electric cooking story by drawing an analogy with electric light. The new fall ad, for instance, shows an 1890 couple being surprised as a young miss flips on the new electric light.

"*Then* lighting went electric" says the caption. By way of comparison, the ad presents the electric cooking story by a similar photograph which shows a modern miss switching on the electric range as her delighted parents stand by. The caption is: "*Now* Cooking's Going Electric."

Theme center of the fall promotion is an animated window display in which the analogy of electric light to electric cooking is dramatically presented by color enlargements of national ad photographs in which the electric light in the top illustration flashes on and off and a surface unit of the electric range in the bottom picture flashes on and off in red. Two are connected by a die cut red arrow that flashes on and off, drawing the comparison of the electric light and electric cooking close together.

For supplementary use inside the showroom, a die cut counter card is supplied that shows a woman switching on a giant electric range switch. Copy is the same as window display.

Other materials supplied dealers in the campaign and which are sampled in the kits mailed out, are specially prepared local newspaper ads; direct mail pieces including a large self-mailer and a smaller bill stuffer; colored designs for billboards; car cards and truck banners and a plan book that completely describes the campaign and its collateral materials.

The emblem of the campaign is a photograph reproduction of an actual electrical range switch on which the campaign theme is printed. This is made available as window and windshield stickers and as envelope and letterhead stickers. This emblem is predominant in all the materials as well as in the fall national advertising. It is also available in mat or electrotype form for use as trademark identifications for other dealer advertising.

Theme center of the promotion, this animated window display tells the electric range story in flashing lights.

Trademark of the MKB Electric Range Campaign for fall as shown above, appears in all promotional materials, advertisements, and is also produced as window, windshield and envelope stickers.

An innovation for electric range advertising is presented in a radio transcription containing 16 one minute dramatized announcements on the theme, "The Switch is On." Manufacturers participating in the Bureau campaign have underwritten the production costs of this special recording and much of the cost of extra records so that a utility or dealer can purchase the "platters" for only $3.50. Each announcement is a dramatized story in verse and song with direct bid for action in buying electric ranges. Full space is allowed for dealer's signature by local announcers and other copy that the dealer may wish to include. This recording was prompted by the unusual success of a similar one produced for water heaters in the Bureau's spring campaign which was broadcast by more than 100 stations.

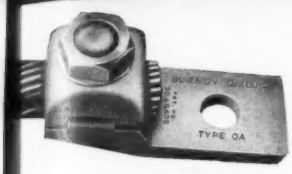
A local merchandising campaign called "Switch-Over Month" is outlined in the Plan Book for utilities and dealers to carry on at their own selected times during the fall and which capitalizes on the full amount of the national advertising as well as the local "The Switch is On" publicity.

Dealers and utilities that have not received sample kits can do so free of charge by writing to the Modern Kitchen Bureau.

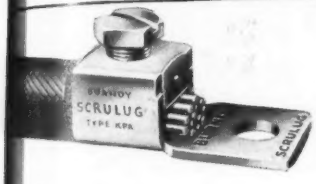
Connected!

90% OF THE CONNECTIONS IN THE INDUSTRIAL LAYOUT

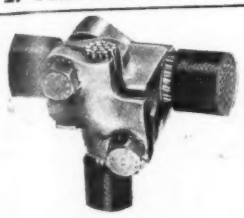
Made with 6 BURNDY CONNECTORS



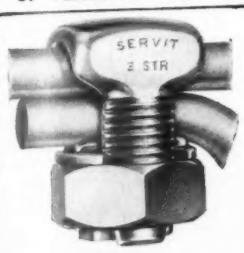
1. QIKLUG - QA



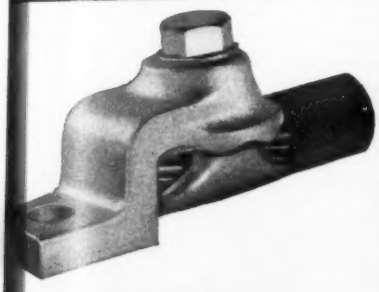
2. SCRULUG - KPA



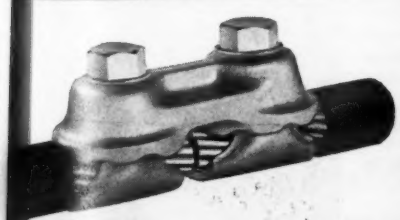
3. VERSITAP - QPX



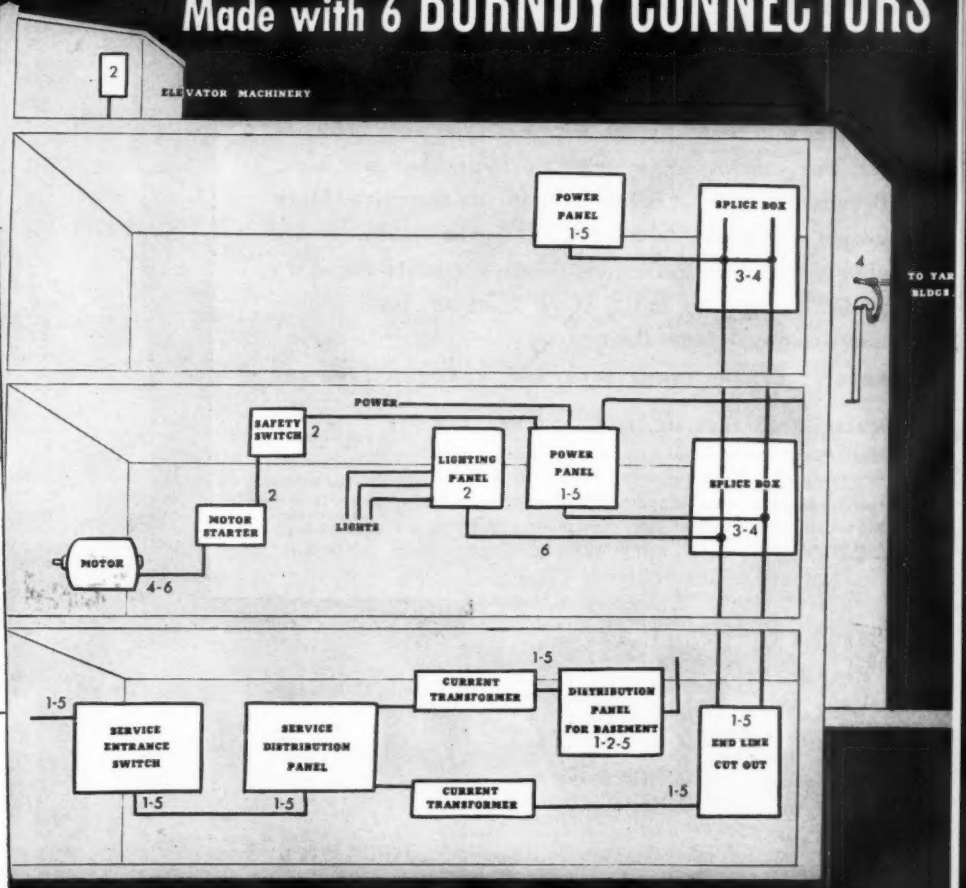
4. SERVIT - KS



5. VERSI-LUG - EA



6. VERSI-LINK - ER



The average* industrial wiring layout—a planned arrangement of switches and panels and wiring—requires a score of different connections, yet six Burndy connector types "hook it up" almost from basement to roof. From the service entrance switch to the last power panel they connect every part of the industrial layout. Burndy connectors are versatile not only in application, but take a wide range of conductor sizes too . . . so a small number of types and sizes *do the job*. Speed up your hookups—with Burndy Connectors!

Send for the handy **BURNDY** catalog

To the *Burndy* Engineering Co., Inc.
459 East 133rd St.
New York, N. Y.

Kindly send me a copy of the Burndy Catalog No. 41.

Name_____ Title_____

Company_____

Address_____

*On your heavy duty installations involving bus bar, channel bus, tubular bus, etc., get the connector data from Burndy.

Sales Keep Going Up

ADD TO YOUR PROFITS ***this year by featuring these fast-selling Arvin Circulating Heaters***

Dealers sold more Arvins last year than ever before—and this year, sales are going up to another new high. Because the market is bigger and more receptive. More people appreciate the need for an Arvin—and more are able to buy. So don't miss this opportunity for extra profit. Order your initial stock from an Arvin jobber now—and cash in on the early sales.

NOBLITT-SPARKS INDUSTRIES, INC., COLUMBUS, INDIANA

MECHANICAL SPECIFICATIONS OF HEATERS

Operate on AC only, 50 to 60 cycles, 110 to 125 volts.

Heating Element, nichrome helical coil with moulded porcelain supports.

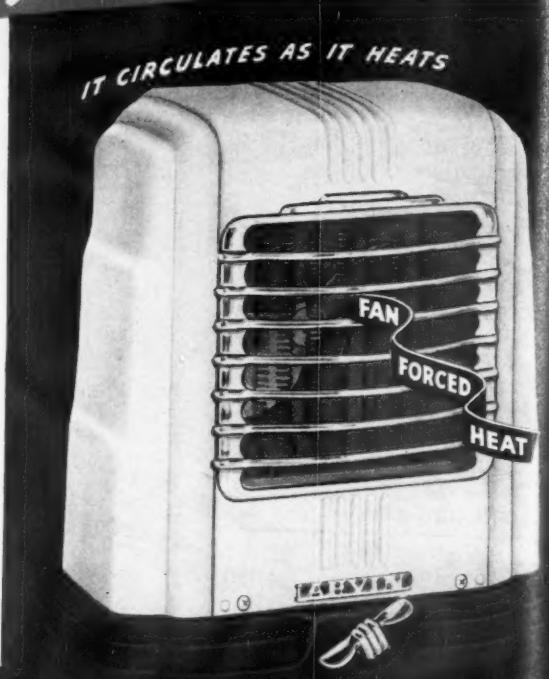
Motor, induction type does not interfere with radio.

Fan, 2-blade propeller type.

Housing, heavy gauge steel with rubber feet.

Approved by Underwriters' Laboratories and Good Housekeeping Institute

ARVIN CONSUMER ADVERTISING in all the leading national magazines shown above help you sell. Other effective sales helps given free to Arvin dealers include: Counter-window display card, beautifully printed in colors, and prospect-selling folders to hand out or mail with statements. Ask your Arvin jobber for this free material that links you up with the millions of Arvin consumer messages in the national magazines.



Deluxe Model 201A above. Ivory enamel finish, maroon trim. Chrome grille. Toe switch and glow light. 12" tall. List.. $10.50

Model 201, same design and size with tan finish, brown trim. List..... $9.50

Standard Model 101 at left. Smaller size, 10" tall. Two-tone green enamel. List.. $7.50

Selling Points for You...

Warms Air Completely—drawing in cold air from floor, heating it and fan-forcing it into room.

Circulates Heat—employing efficient fan-distributing principle.

Portable—plugs in any 110 AC, 60 cycle outlet. Safe with children.

ARVIN

FAN – FORCED

Circulating Heaters

ESSENTIAL FOR BATHROOMS

AND MANY OTHER PLACES

Consumer Advertising features Arvin as essential equipment for bathrooms—for bathing, shaving and dressing. It's sold for many other uses, too.

Thousands Sold every year for trailers, camp cottages, small offices, ticket booths and many other places.

Mississippi Utility Ends Appliance Merchandising

As soon as present stocks are depleted, the Mississippi Power and Light Company will discontinue the sale of major appliances, according to a recent announcement made by Les M. Taylor, general sales manager. All Mississippi Power and Light Company stores except those in inactive dealer towns, will neither stock nor sell appliances.

This step was made because of the growth of an aggressive dealer organization which has taken full advantage of the assistance and cooperation offered by manufacturers, jobbers, distributors and the company's dealer sales programs and campaigns to sell major appliances. It is anticipated that by January 1, 1942, the company will have no major appliances in stock.

By retiring from the major appliance field, the company has shown its full confidence in the dealers in the area served. The company feels these dealers will continue to supply the needs and wants of the market in the area. In a continuance of its policy to give all out aid to the dealer, the company is adding two new dealer coordinators and one home service advisor. A negro home service advisor is being added to cover work needed in that field.

The company will continue to sell small appliances such as roasters, toasters, mixers, lamp bulbs and I. E. S. lamps, etc.

Mr. Taylor announced the Mississippi Power and Light Company's new merchandising policy in a letter which read, in part:

"For your information, our company plans to discontinue the merchandising of major appliances in our territory as soon as our present stocks are exhausted. This includes such items as electric ranges, water heaters, laundry equipment, attic fans, etc.; in the gas division, such items as gas ranges, water heaters, and space heaters. We will continue to aggressively promote through effective sales promotion, advertising, home service demonstrations, and dealer coordinator assistance the sale of all electric and gas equipment through retail dealer outlets.

"The company is now putting into effect a complete mass coverage program to increase equipment sales through dealers which will include more group demonstrations in customers' homes, more floor demonstrations in dealer stores, more demonstrations before women's clubs, etc., more cooking schools, increased dealer coordination personnel coverage, more effective dealer coordination training, more effective newspaper, radio, and direct mail advertising, and closer coverage of commercial and industrial customers.

"Planned sales programs designed to secure maximum benefits for all dealers in the territory will be conducted as in the past."

Trade Improves in Southwest; Best Gains Still in South

Outstanding regional trade improvement occurred in the Southwest during July and early August. Trade gains in that section, which ranged from 15 to 25 per cent over 1940 in June, widened to 25 to 30 per cent, reports Dun & Bradstreet, Inc. The South continued to lead all sections, however, with the Middle West and Pacific Coast also chalking up large gains. Sales increases over last year tended to narrow in several Eastern centers.

Eleven regions, six of which were in the South and three on the Pacific Coast, made larger trade gains over 1940 than the country-wide increase of 25 per cent in June. Detroit again led all other regions with a rise of 36 per cent.

Other regions continuing at the best levels in history for this season were: Indianapolis and Louisville, Maryland and Virginia, Carolinas, Atlanta and Birmingham, Florida, Memphis, New Orleans, Texas, and Portland and Seattle.

Washer and Ironer Sales Increase Over Last Year

Household washers shipped by the members of the American Washer and Ironer Manufacturers' Association in June totalled 188,365, compared to 122,134 in June, 1940, and 206,030 in May, 1941, according to industry figures reported to Joseph R. Bohnen, executive secretary-treasurer, Chicago, by Ernst and Ernst, certified public accountants. Ironers shipped in the month totalled 20,283, consisting of 8,435 portables and 11,848 cabinet models, compared to 8,571 a year ago, 2,396 portable and 6,175 cabinet models. May shipments were 21,767, portables aggregating 10,088 and cabinet models, 11,679.

A prize winning small appliance display won favor recently in Houston, Texas, in a contest for improved displays of small electric appliances. Proud winner is E. A. Bullington of the City Sales Department, of Peden Iron & Steel Co., in Houston. The Houston Lighting & Power Co. picked this window on the basis of best arrangement of displays in amount of space and best use of sales material and displays in connection with actual appliances.

Washer shipments in the half-year amounted to 1,088,288 units, compared to 777,576 in the same period of 1940. Ironers aggregated 122,483, consisting of 59,658 portable and 62,825 cabinet, as against 63,749, made up of 16,590 portable and 47,159 cabinet, in the first half of 1940.

Coward Named Chairman Of MKB Range Committee

C. J. Coward, advertising and sales promotion manager of Nash-Kelvinator Corporation, will serve as chairman of The Modern Kitchen Bureau Electric Range Committe for 1942. This committee plans and supervises the electric range national advertising and the sales promotion campaigns for electric utilities and dealers.

Appliance Store Sales Trends Studied by U.S.

Net sales of 129 credit-granting household appliance stores reporting to the Department of Commerce for the annual retail credit survey increased 9.5 per cent in 1940 compared with 1939 with installment sales accounting for 72.9 per cent of the year's trade; open-credit sales, 17.7 per cent; and cash sales, 9.4 per cent.

Installment-credit accounts receivable outstanding on the first day of the average month of 1940 declined 0.3 per cent from 1939, a decrease which the Department of Commerce said was perhaps influenced by retailers' sales of accounts to financing agencies.

The report, which was prepared by the Credit Research Staff of the Department shows that the average monthly dollar volume of collections on installment accounts by the reporting stores gained 2 per cent from 1939 to 1940. The ratio of these collections to first-of-month balances increased fractionally from 10.2 per cent in the average month of 1939 to 10.5 per cent in 1940. This change, it was said, represented an increase of about 3 per cent in average monthly collections per $100 of outstanding accounts in 1940.

Open-credit collections by the reporting stores increased from an average of 59.1 per cent of first-of-month balances in 1939 to 63.0 per cent in 1940. This increase of 6.6 per cent in the average rate of collections per $100 of outstanding accounts in 1940 was computed from data submitted by a very small sample of stores and thus may not be representative of conditions throughout the industry, the Department said.

Installment-credit bad-debt losses decreased from 1.66 per cent of installment sales of identical stores in 1939 to 1.40 per cent in 1940, representing a reduction of 15.7 per cent in the average rate.

What's Being Said and Done in Washington

By Wilfrid Redmond

Three measures to curtail electric appliance production and so release critical materials to defense plants have been undertaken in Washington during the past month.

First was the announced program of Leon Henderson for a production cut of 50 per cent for electric refrigerators and 30 per cent for home laundry equipment, with other appliances scheduled for curtailment later.

Second move was passage by the House of a tax bill calling for an excise tax of 10 per cent on refrigerators and electric appliances.

The third curtailment measure was an executive order from the President August 9 empowering the Federal Reserve Board to regulate consumer credit.

Following the President's order, Chairman Marriner S. Eccles of the Board, said: "Restriction of consumer credit should dampen the demand for consumers' durable goods, such as automobiles, washing machines, refrigerators, ironers, vacuum cleaners, and many other goods, at a time when their production needs to be curtailed in order to release materials, labor, and plant capacity required to increase production for defense."

The Board is directed to consult with a committee consisting of the Secretary of the Treasury Morgenthau, Federal Loan Administrator Jesse Jones, and OPACS Administrator Leon Henderson, in formulating policies with respect to down-payments, maturities, and other questions of general policy.

Measures regulating installment terms will not be drastic at the start, the Federal Reserve Board has indicated. The order directs the Board to regulate terms both for new and used appliances.

The affect of restriction of installment terms upon demand was stated by Leon Henderson before the Senate Banking and Currency Committee when he appeared in support of the Price Control Bill.

"We know," said Henderson, "that an increase of one per cent in the down payment, or a decrease of one per cent in the time that the installment period runs, will ordinarily bring a reduction of one per cent in the demand."

Appliance Taxes

The tax bill which passed the House and is now before the Senate Finance Committee is not expected to undergo any change with respect to the excise tax provisions for appliances proposed by the House. Refrigerator excise tax has been increased from 5½ to 10 per cent and broadened to include commercial types of refrigerators and components of both household and industrial types of refrigerator units. Air conditioning equipment also comes under the refrigeration tax.

The 10 per cent tax proposed by the House on electric appliances covers fans, storage water heaters, irons, air heaters, immersion heaters, electric heating pads and blankets, all cooking and food warming appliances, mixers, whippers, and juicers, and vacuum cleaners. Washing machines and ironers are not included under the tax.

While household appliances are being subjected to more and more

(*Continued on page 50*)

THE Switch is ON... COOKING'S GOING ELECTRIC!

. . . THAT'S THE THEME OF THE BIGGEST MKB RANGE ADVERTISING CAMPAIGN IN HISTORY!

INDUSTRY ADVERTISING that heralds "The Switch is to Switches" now appears in five national magazines. It sells electric ranges ten months out of the year. More than 60,000,000 selling messages reach *your* customers during 1941. This is the . . .

BIGGEST INDUSTRY NATIONAL ADVERTISING CAMPAIGN in the history of electric ranges. It is sponsored by the manufacturers listed below, and it offers you an outstanding opportunity to make greater sales and greater profit *right now*, because . . .

"SWITCHOVER MONTH", the MKB Fall Range Promotion, brings the full impact of all this advertising right onto your own sales floor. It's a *complete* campaign — Plan Books, Window Displays, Direct Mail, Counter Cards, Newspaper Ads, transcribed one minute Radio Programs — all tied *together* and all tied-in with the theme of the national advertising!

NATIONAL ADVERTISING . . "THE SWITCH IS TO SWITCHES AGAIN"
. . . "SWITCHOVER MONTH"
ELECTRIC RANGES
Switchover MONTH
"THE SWITCH IS ON"

Geared together!

SWITCHOVER MONTH—the industry's newest promotion—and The Switch is to Switches—the industry's greatest national advertising theme—tie right in with each other like a pair of gears! Be sure that *you* tie in, too! It will mean that you CASH in. Ask your electric league, distributor, utility or any of the manufacturers listed below. Or write to:

THE MODERN KITCHEN BUREAU, 420 Lexington Avenue, New York, N. Y.

DUTCH-OVEN • ESTATE • FRIGIDAIRE • GENERAL ELECTRIC • GIBSON • HOTPOINT • KELVINATOR • MONARCH • NORGE • QUALITY • STEWART-WARNER • UNIVERSAL • WESTINGHOUSE

White Named President Of Walker Electric Co.

Following the death of Ralph M. Walker, on July 30, 1941, K. D. White assumed full responsibility for the management of the White Electrical Construction Co., which maintains headquarters in Atlanta, Ga. Mr. White had been associated with Mr. Walker in the electrical contracting business since 1913.

Mr. White reports that no changes will be made in the personnel of the White Electrical Construction Co., which includes W. A. Hitchcock, O. M. Carnes, H. L. Sudderth, and T. R. Knight, all of Atlanta; B. P. Waters and C. F. Patterson, of Columbus, Ga.; and H. O. Burnside, of Greensboro, N. C.

Mr. White has also acquired control of the Walker Electrical Company, of which he has been elected president and treasurer. T. J. Fleischer continues as vice-president in charge of sales. Other personnel includes H. L. Sudderth, assistant treasurer; and T. R. Knight, secretary. The board of directors consists of Mr. White, Mr. Fleischer, and Carroll Payne Jones, of the Trust Company of Georgia, representing Mrs. Walker, who will continue to have a substantial interest in the company's stock.

"The new officers of the company will devote their best energies to the business which has a very bright future," reports Mr. White, "due to the fact that considerable money from insurance carried on Mr. Walker's life is now in process of collection and will thus increase the company's assets, and also because of the fact that we have a full book of orders essential to the defense effort and, therefore, should be able to get raw materials to enable us to continue at our full capacity."

Re-Wiring Promotional Aids Prepared by Edison Institute

A series of new promotional materials, designed to aid electric utilities in selling the economic advantages of the new small-diameter building wire for commercial and industrial building rewiring, has been prepared by the Wiring Committee of the Edison Electric Institute.

A pocket-size kit, containing materials for a demonstration of the way in which small diameter wire increases electrical capacity, at low cost and without expensive alteration and re-decorating of the building, forms the spearhead of the program. Samples of small diameter wire combinations for ½" and ¾" conduit, samples of standard wire combinations for these sizes of conduit, and pieces of the conduits themselves are enclosed in the kit.

Thus, the Wiring Committee points out, by passing the different combinations through the conduit, even the non-technical building owner or manager can see for himself the additional capacity that thin-wall insulation wire will bring to his building, and how the new wiring can be drawn through existing conduit at comparatively minor cost.

Illustrated talks on commercial and industrial wiring, and on residential wiring, have also been prepared by the Committee. Scripts adaptable for almost every type of possible audience are furnished, with suggestions for their most profitable use. Full color lantern slides greatly increase the effectiveness of the presentations.

A handbook on the new small diameter wire, complete with tables, etc., is also in preparation and will be released shortly. The pocketsize handbook will present all the facts on small diameter wire's importance, and how utilities can best promote it.

We have given organized thought and action," said C. E. Greenwood, commercial director of Edison Electric Institute, "to the wiring problems of the residence and the importance of adequacy in copper capacity for efficient results in the operation of the many appliances in the home. The message is registering in the public mind. Utility men believe that now is the opportune time to pave the way for the building owner and manager to modernize commercial and the industrial structures by increasing copper capacity to allow for future needs in modern lighting, air conditioning and other electric services which are essentials for the occupants.

"The Wiring Committee of the Institute has produced the promotional items, and we are ready for our educational campaign through the utility companies."

Prices of these materials are: demonstration kit, $1.75; illustrated talks, commercial and industrial, $17.50; residential, $35.00; handbook, 25c for single copies, 10c each for orders of 25 or more. Materials may be ordered from the Commercial Department, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y.

This demonstration kit prepared by the Wiring Committee of the Edison Electric Institute makes the increased capacity and low-cost installation of small-diameter wire clear even to the non-technical prospect.

WHY IT'S YOUR PATRIOTIC DUTY
To Simplify Building Wire Lines
BECAUSE
YOU'LL SAVE COTTON
YOU'LL SAVE COPPER
YOU'LL SAVE RUBBER
U. S. RUBBER Laytex* Small Diameter Wire is the Ideal All-Purpose Branch Circuit Building Wire . . . Sizes 14 to 6 A.W.G.
*REG. U. S. PAT. OFF.
THIS WIRE WASTER WITH HIS MULTIPLICITY OF BUILDING WIRE TYPES MUST GO!
UNITED STATES RUBBER COMPANY
US
TRADE MARK

SEE YOU at booths 10 and 11 National Electrical Contractors Association Convention... Rice Hotel, Houston, Texas, Oct. 6th, 7th, 8th. You can have TARGET PRACTICE...play OTHER GAMES ...WIN PRIZES. Be sure to come...and HAVE FUN!

United States Rubber Company

1230 SIXTH AVENUE, ROCKEFELLER CENTER, NEW YORK

MANUFACTURERS of Electrical Wires and Cables • Tapes • Splicing Compounds • Linemen's Blankets • Switchboard Matting • Wiring Devices Battery Separators • Etc.

Construction Materials Shortage Discussed

Problems of speeding delivery of materials to the electrical contractor in the present emergency were discussed by J. P. McIlhenny, sales manager of the wiring materials field organization of the General Electric Company, at the convention of the New York State Association of Electrical Contractors and Dealers, at Saranac Inn, N. Y., July 7.

Mr. McIlhenny warned that "we are still in the building stage of the defense program" and that "with the enormous expansion due in the almost immediate future, its effects are bound to be felt to a far greater degree than at present within our own industry."

Some suggestions offered by Mr. McIlhenney of how the electrical contractor can help were:

Prompt placing of orders as soon as possible after the award of a job. "It is amazing," Mr. McIlhenny commented, "how much delay is encountered in getting many contractors to the point of actually placing their orders."

Where materials for defense projects are involved, priority numbers or defense classification of the job should be indicated on the orders.

The contractor can help immeasurably by sticking to standard items, though he may prefer certain small demand items. An extreme example of this is in the box industry. General Electric discontinued the listing of 66 box items several months ago, but still lists 197 catalogue numbers, most of which are furnished in both black and galvanized.

Often distributor and manufacturer can complete orders much more quickly if contractors supply alternate catalogue numbers when ordering materials in quantities.

Distributors are confronted with problems, as well as the manufacturers, Mr. McIlhenny said. One of these is breaking in green help to replace those lost through the draft. Eighty per cent of draft deferments requested by electrical distributing organizations have been refused. The multiplicity of items handled makes this a serious problem.

Another distributors' problem is that of finding sufficient quantities of required items for their trade. This is the result of the inability of many manufacturers to provide the necessary amounts of needed items to their regular distributor customers. In this case, distributors are forced out into the open market. Further delays are frequently the result.

Sometimes these unavoidable delays cause pyramiding of orders —an evil every manufacturer and distributor would like to see eliminated. Where a contractor feels he must go to more than one source of supply, he should refrain from placing duplicate orders and choose only that source of supply which provides him the best reliable promise of delivery.

England Calls For Trained Electricians

An opportunity to see and take part as non-combatants in the most critical fight in the history of the world—the Battle of Britain—and to get paid at the same time, is currently open to every American electrician with first-class knowledge of electrical repairing.

This opportunity is offered through the recently established Civilain Technical Corps, a non-military body of paid volunteer workers, set up by the British Government to service technical equipment used by the armed forces of Britain and her allies.

Volunteers accepted for membership in the Corps receive two-way transportation across the Atlantic, food and lodging, uniform, minimum weekly salaries of 6/0/0 pounds ($24.12) and two-week vacations. In addition they will receive free medical treatment and hospital facilities.

Corps headquarters in the United States have been established in New York at 15 Broad Street, with the full approval and endorsement of President Roosevelt and the State Department. Applications for membership, according to the Corps, totaled more than 6,000 in the first three weeks.

By recent declaration of the United States Government, applicants accepted for membership in the Corps may be deferred by their local draft boards from military training in the U. S. Army. Such members will not lose their United

Riechman-Crosby Co., of Memphis, Tenn., one of the South's leading electrical distributors, can advantageously use its own offices in the promotion of lighting fixture sales. These before and after pictures show the tremendous improvement which followed the installation of 26 fluorescent fixtures spaced 8 feet apart to give adequate light for a floor space of 32,000 sq. ft. In each fixture there are four 40-watt white fluorescent lamps. The total wattage is approximately 4160 watts. The picture at the right indicates the even distribution of light on desks and floor obtained with the new system. The picture at left is a view of the same office before relighting. Twelve indirect fixtures were used each equipped with 1000 watts in incandescent lamps.

States citizenship and will not be required to swear an oath of allegiance to the King. Further, if at any time the United States Government should require the services of any of the American volunteer members of the Civilian Technical Corps, the British Government has agreed that they will be released immediately.

Pointing out that while 11 classes of technicians in all are needed and eligible for membership, Corps headquarters has stated that modern military armies depend largely on trained technicians to keep all of their highly specialized equipment in use, and that among the most proficient technicians in the world are in the United States.

Trained electricians will be accepted between the ages of 18 and 50 years. Their work will include the maintenance and repair of many types of electrical gear as well as the installation, maintenance and repair of electrical equipment and ignition systems in transport.

Applicants should be skilled. Complete technical requirements will be supplied on request.

Application blanks will be furnished on request from any British Consulate or by writing to the Civilian Technical Corps, c/o the British Consul General, 25 Broadway, New York. Following receipt of applications, prospective members of the Corps will be notified by mail where and when to report for examination.

Illuminating Engineering Society Names Officers

Willard C. Brown, executive engineer of the Nela Park Engineering Department of General Electric Company at Cleveland, O., has been elected president of the Illuminating Engineering Society, and will assume office October 1, according to an announcement made to the I. E. S. Council on June 12 by A. D. Cameron, present holder of that position.

Other national officers elected are: general secretary—A. Dexter Hinckley, assistant to the Dean of Engineering, Columbia University, New York; treasurer—Gilbert K. Hardacre, Public Service Company of Northern Illinois, Chicago; vice-president until September 30th, 1943—Howard M. Sharp, manager, Lighting Bureau, Buffalo, Niagara & Eastern Power Corp., Buffalo, N. Y.; directors until September 30, 1944—Ralph G. Raymond,

RUBBER COVERED POWER CABLES • BUILDING WIRE

CRESCENT

Heat Resistant

ENDURITE

INSULATED

CABLES

For Light and Power

Permitting Use Up To 75° C.

TYPE RH AND RHL

and to Federal Specifications

JC-106-A, JC-121

NOW more economical to use due to higher permissable current carrying capacity.

ENDURITE INSULATION'S superior heat resisting and high dielectric characteristics make it specially suitable for use when electrical conductors are required to meet abnormal temperature and aging conditions.

CRESCENT INSULATED WIRE & CABLE CO.

Ask Your Wholesaler For

CRESCENT

WIRE and CABLE

Factory: TRENTON, N. J.—*Stocks in Principal Cities*

SOUTHERN REPRESENTATIVES

ATLANTA, GA. Edgar E. Dawes A-4 Rhodes Bldg. Annex

NEW ORLEANS, LA. Paul Hogan, Jr. 823 Perdido St.

DALLAS, TEXAS Huie-Simmer Co. 103 Thomas Bldg.

CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

VARNISHED CAMBRIC • FLEXIBLE CORDS • LEAD-ENCASED AND PARKWAY CABLES • ARMORED CABLE

CRESCENT ENDURITE SUPER-AGING INSULATION

Commonwealth Edison Company, Chicago, and Lee E. Tayler, Detroit Edison Company, Detroit, Mich.

In addition, the following regional vice-presidents were elected: For one year term ending September 30, 1942, Norman B. Hickox, 20 North Wacker Drive, Chicago, representing Midwestern Region; A. F. Wakefield, of the F. W. Wakefield Brass Co., Vermilion, Ohio, representing Great Lakes Region; O. P. Cleaver, Westinghouse Lamp Division, Bloomfield, N. J., representing Northeastern Region; and Frank A. Hansen, Director, Western Institute of Light and Vision, Los Angeles, representing Pacific Coast Region. The following Regional Vice-presidents will serve for a two-year term ending September 30, 1943: A. S. Turner, Jr., General Electric Co., Phiadelphia, representing East Central Region; P. M. Rutherford, Jr., Dallas Power and Light Co., Dallas, Texas, representing Southwestern Region; R. M. Love, General Electric Co., Toronto, Canada, representing Canadian Region; and W. J. Amoss, New Orleans Public Service, Inc., New Orleans, La., representing Southern Region.

Southeastern Engineers to Meet in St. Petersburg

The dates of September 25th and 26th have been set for the Fall meeting of the Engineering and Operation Section, Southeastern Electric Exchange, which will be held in St. Petersburg, Florida, at the Suwanee Hotel with the Florida Power Corporation as host, according to announcement by J. W. Talley, executive secretary of the Exchange.

Chairman Lewis Payne is arranging an interesting program to include authoritative speakers on subjects dealing with many of the problems brought about by the present emergency, and as usual, there will be ample time provided for informal dicussion of operating and engineering matters not covered by scheduled papers.

Even though all of the companies are extremely busy in meeting the many demands being made upon the industry by the defense program, many of the members have expressed the opinion that there is definitely more need now for this conference than ever, where each may have the opportunity to exchange experiences on how many of the problems have been solved or are being solved.

The hotel has offered the attractive rates of $2.50 for single and $4.00 for double rooms, European Plan, for those attending this conference.

Southern Section Membership Campaign Successful

The following members of the Southern Section have enrolled one or more new members for the association since the current membership campaign was initiated at the close of the annual meeting, last September. Numbers at right indicate number of new members enrolled.

Name:	No. Enrolled
Bagwell, H. O.—Carrollton, Ga.	1
Bommer, A. J.—Dallas, Texas	14
Camus, Frank—Shreveport, La.	9
Campbell, R. D.—Asheville, N. C.	1
Clark, R. A.—Atlanta,, Ga.	1
Coleman, E. C.—Monroe, La.	1
Darrow, Ed.—Atlanta, Ga.	1
Dougherty, C. H.—Franklin, Va.	1
Eaton, W. M.—Norfork, Va.	2
Eberling, J. H.—Houston, Texas	2
Edwards, Virge—Lyon, Mass.	16
Fisher, J. G.—Jackson, Miss	6
Fletcher, G. R.—Alexandria, Va.	2
Goodson, Fred—Houston, Texas	3
Hancock, A. C.—Austin, Texas	5
Hendricks, R. B.—San Antonio	9
Jones, C. T.—Atlanta, Ga.	1
Keeley, K. K.—Shreveport, La.	2
Kenderdine, E. L.—Ft. Worth, Texas	2
Kersey, T. M.—Dallas, Texas	6
King, A. T.—Marietta, Ga.	1
Knox, E. C.—Miami, Fla	2
LaTour, John—Daytona Beach, Fla.	1
Lyncker, F. O.—New Orleans, La.	1
McCammon, J. N.—Jackson, Miss.	2
McKinney, E. W.—New Orleans, La.	2
Mathieu, L. D.—Corpus Christi, Texas	1
Miller, G. M.—Richmond, Va.	3
Muller, Paul—New Orleans, La.	2
Murphy, J. M.—Roanoke, Va.	1
Muths, S. L.—Gulfport, Miss	1
Pantel, H. L.—Muskogee, Okla.	1
Peters, K. O.—St. Petersburg, Fla.	2
Probes, C. V.—New Orleans, La.	1
Sagendorf, F. P.—Fairfax, Va.	1
Segall, B. Z. New Orleans, La.	12
Speights, J. L.—Richmond, Va.	2
Sprouse, J. B.—Clarksdale, Miss.	7
Stewart, W. B.—San Antonio, Texas	1
Turnage, L. A.—Hartsville, S. C.	1
Verrett, J. A. Port Arthur, Texas	2
Weber, Chas.—Beaumont, Texas	1
Welman, George—New Orleans	4
Whitner, Jos.—Atlanta, Ga.	4
Yancey, W. H.—Charlotte, N. C.	1
Yelgerton, T.—Sylvarena, N. C.	1
Zimmer, Chas.—Houston, Texas	4
Applications Not Endorsed	6
Total	153

Six Vice Presidents for Alabama Power Appointed

Election of F. C. Weiss and Joseph O. Henkel, Jr., as vice-presidents of Alabama Power Company was announced August 15 by the company's board of directors.

The company also announced the election of four division managers to division vice-presidents of the company. They are Henry Maulshagen, manager of the Western division, with headquarters at Birmingham; Otto K. Seyforth, manager of the Eastern division, with headquarters at Anniston; A. D. Quackenbush, manager of the Mobile division, with headquarters at Mobile, and C. T. Hunter, manager of the Southeast division, with headquarters at Eufaula.

Mr. Weiss, a native of Texas, became associated with Alabama Power Company in 1913, the year he was graduated in electrical engineering from Massachusetts Institute of Technology.

Mr. Henkel, a native of Misssissippi, was graduated in 1912 in electrical engineering from Mississippi A. & M. College and became associated with Alabama Power Company in 1919.

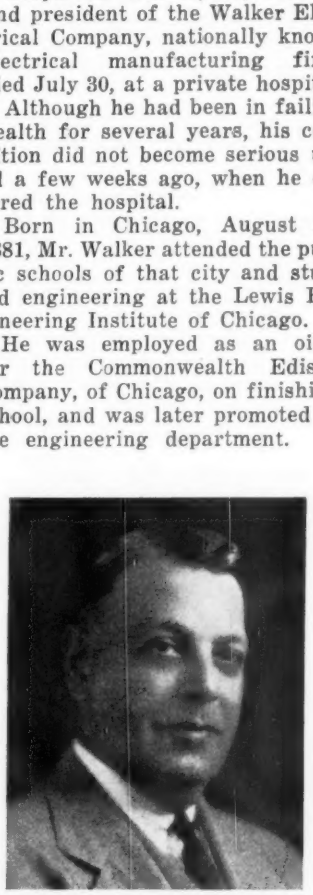
Death Claims Leader of Electrical Contractors

Ralph M. Walker, 59, founder and president of the Walker Electrical Company, nationally known electrical manufacturing firm, died July 30, at a private hospital.

Although he had been in failing health for several years, his condition did not become serious until a few weeks ago, when he entered the hospital.

Born in Chicago, August 26, 1881, Mr. Walker attended the public schools of that city and studied engineering at the Lewis Engineering Institute of Chicago.

He was employed as an oiler for the Commonwealth Edison Company, of Chicago, on finishing school, and was later promoted to the engineering department.



Ralph M. Walker

For several years he was in the employ of Schweitzer & Conrad, electrical manufacturers, of Chicago, then moved to Selma, Ala., where he organized his own business. He also operated branches of

his contracting service in Columbus, Ga., and Rome, Ga.

In 1917, he consolidated his far-flung electrical contracting agencies into the Walker Electrical Company and moved offices to Atlanta. He had been the company's only president.

Former vice president of the National Electrical Contractors' Association, he was acting executive committeeman for eight southern states, and was a member of the National Electrical Manufacturers' Association.

In 1939 he received the James H. McGraw award, contractors' medal, in recognition of his long leadership in promoting better trade practices in the electrical industry.

Arkansas Utility Pioneer And Leader Passes Away

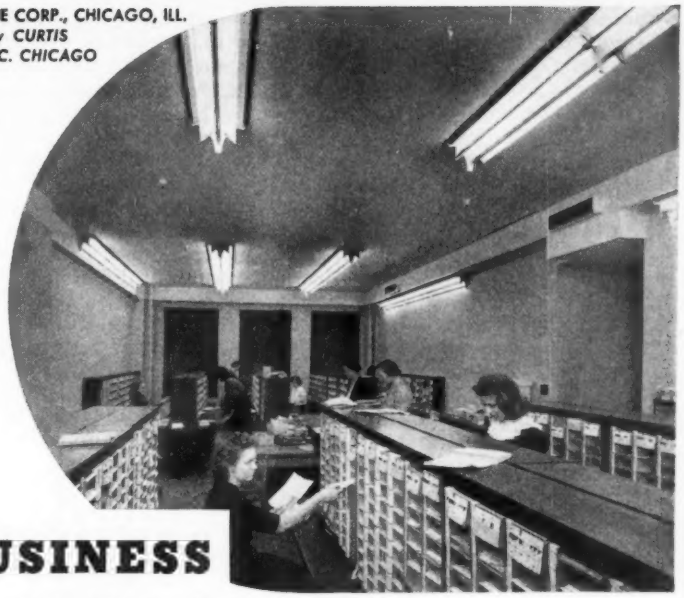
A heart ailment that struck him more than a year ago brought death on July 31 to Harvey Couch, 63, Arkansas farm boy who built and headed a far-flung Southwest rail and utility empire.

The industrialist died at Couchwood, his summer home near Hot Springs, where presidents and humble farm neighbors had been his enthusiastic guests on many occasions.

President of the Arkansas Power & Light Company and board chairman of the Kansas City Southern Louisiana & Arkansas Railway lines, Mr. Couch had been in virtual retirement since July 1940. He became ill in February, 1940, when he suffered an influenza attack, but continued his private and public activities until his heart condition forced him to

Harvey C. Couch

F. W. DODGE CORP., CHICAGO, ILL.
Installation by CURTIS LIGHTING INC. CHICAGO

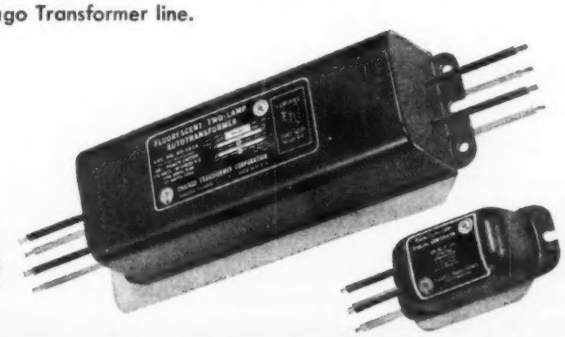


BUSINESS re-lights!

For Working Comfort and Increased Efficiency

Yes—America relights—in homes and business. And in defense industries where maximum efficiency is required, sight saving fluorescent lighting is rapidly becoming a symbol of *right light* . . . the right light to minimize the danger of eyestrain . . . to help speed national defense orders by reducing errors caused by faulty lighting.

But an installation is only as good as its ballasts. That's why you should look for these seals: (UL) to be sure that the ballast has been tested and approved for safety: (ETL) to know that it has been laboratory tested for heat tolerances, Watt input control, hum, and wave shape tolerances; (CT) for assurance of dependability and quality. Write for bulletin FBB-0430, giving full details of the entire Chicago Transformer line.



CHICAGO TRANSFORMER CORPORATION
3507 WEST ADDISON STREET • CHICAGO

enter Johns Hopkins Hospital last summer. He returned to Couchwood in October,

Born in the little Columbia County community of Calhoun on Aug. 21, 1877, Couch received only a rural school education.

He surrendered many of his titles during the last ten years, but in addition to his posts with the A. P. & L. and K. C. S.-L & A, Mr. Couch at the time of his death was a trustee of Edison Electric Institute; Peabody College, Nashville, Tenn.; Southern Methodist University, Dallas; Hendrix College, Conway, Ark.; National Foundation for Infantile Paralysis. He was a national councilor for the United States Chamber of Commerce.

Meeting Dates Set for Oklahoma Utilities Assn.

Dates have been set for two meetings of the Electric Light and Power Division of the Oklahoma Utilities Association.

Miss Kate A. Niblack, association secretary, announces that the eastern district meeting of the division will be held at Muskogee, Okla., October 21, and the western district meeting, at Norman, October 24.

J. C. Happenny, president, Oklahoma Power and Water Co., Sand Springs, Okla., chairman of the division, will have charge of both meetings. Chief responsibility for the programs will fall on T. E. Mansfield, Oklahoma Power and Water Co., chairman of the eastern district, for the Muskogee meeting, and A. P. Burns, Southwestern Light and Power Co., Duncan, for the Norman meeting.

What's Being Said and Done in Washington

(*Continued from page 76*)

pressure in order to curtail production and demand, farm appliances may have a future before them. This is contained in assurances given by OPM Director General Knudsen recently to Department of Agriculture officials that agricultural needs would be taken care of next to armament and would be regarded as semi-military in character. Agricultural officials told OPM chiefs that the demands upon agriculture for increased production is hindered by existing and potential shortages of certain types of farm equipment. There is a very heavy demand at this time for foodstuffs such as meat, egg, and dairy products, said Agricultural officials, and special machinery is required to process them. Among appliances mentioned as possible essential equipment on farms are feed grinders, milk coolers, brooders, pumps, and motors. The Office of Agricultural Defense Relations is near completion of a survey which will detail agricultural needs and be submitted within the next 30 days to OPM.

Two Electrical Goods Committees

Two of the 25 sub-committees that will function with the Electrical Goods Industry Advisory Committee of OPM have been formed and held conferences with defense officials. A technical subcommittee, recently appointed, includes: L. F. Adams, assistant to the vice-president of the General Electric Co.; Frank Thornton, Jr., engineering manager of association activities, Westinghouse; and Howard H. Weber, commercial engineer, U. S. Rubber Co.

A washing machine committee has also been formed but not officially announced by OPM. At a conference with Defense Contract Service officials, washing machine manufacturers were told that their plants can readily be converted to the manufacture of such defense items as hand grenades, tank and submarine parts and fuses.

Public utilities have been assured a steady flow of maintenance and repair parts by an order of August 8 issued by the Division of Priorities which establishes a new Maintenance and Repairs Rating Plan. Electric utilities granted use of the plan will get an A-10 rating which they can apply to their orders for necessary repair and maintenance parts. Nine essential industries were permitted use of the plan. The rating is made available only on application to the Priorities Division of OPM. Rating orders can be served on suppliers for needed replacement materials.

As soon as the Priorities Division can handle the needs of the nine industries listed, the Order will be extended to other industries, it was announced. On the second list will be plants engaged in food processing and storing, including locker plants.

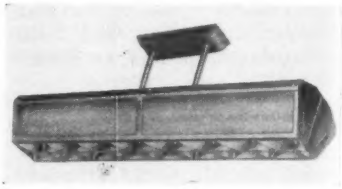
The Priorities Division still is trying to work out a system for allocating replacement and maintenance parts to consumer industries as recommended in a program submitted by Leon Henderson several weeks ago. This list included repair parts for refrigerators.

Lighting Products

Mitchell Shielded Unit

In line with the rising demand for shielded type fluorescent fixtures for store, office and general commercial use, the Mitchell Manufacturing Company, of Chicago, makers of fluorescent lighting equipment, now make available a new 200-watt 4-light shielded fixture, Model 2031. This new fluorescent fixture offers the advantages of low surface brightness, minimum light absorption, higher efficiency, light transmission and louvered down light punch.

Mitchell Model 2031 is an advance-style commercial unit that performs the dual job of general lighting, plus localized lighting, at one and the same time. Its clear, ribbed diffusing glass panels transmit high intensity illumination from sides and top; its louvered bottom gives greatest possible down light punch. Unit comes with canopies, for suspension mounting, but is also available for surface mounting. Uses four 40-watt fluorescent bulbs and is corrected for high power factor and stroboscopic effect. FLEUR-O-LIER and UNDERWRITERS' LABORATORIES approved. Standard approved ballasts, starters, sockets. Information is obtainable through leading wholesale electrical supply distributors.



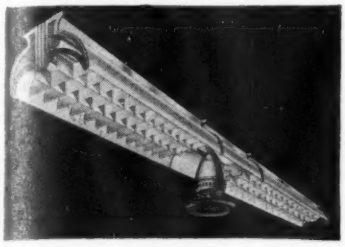
Guth Fan and Troffer

Taking a cue from the stratosphere, where light is brighter and air is cooler, Guth designed the new combination Guthfan and Surface Troffers for luxurious comfort. The popular Surface Troffers provide 75 per cent cooler fluorescent light while the famous Guthfan circulates 7° to 10° cooler air.

The Guthfan couldn't have been designed more appropriately had it been built specifically for use in this fixture. Employing the new principle of Complete Cycle Circulation, the Guthfan draws the 7° to 10° cooler air from the lower part of the room and distributes it downward (at 45° angle) without disturbing the hot

ceiling air or creating drafts that would decrease the efficiency of the fluorescent lamps.

This ideal combination includes 48" luminaires for fluorescent lamps and 18" extension sections for the Guthfan. The luminaires have genuine Diffuse Alzak Reflectors, side baf-

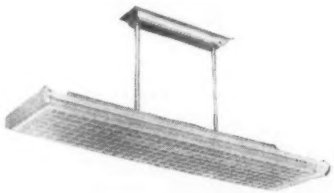


fles for correct shielding, and produce wide light distribution with complimentary ceiling light. The fixture has Satin Aluminum ends with polished highlights and sturdy cast joiners that combine the luminaires and Guthfan in a rigid continuously mounted unit. Extension lengths for additional lighting and cooling capacity are also available. This new unit may be ceiling mounted or suspended from hangers. The Edwin F. Guth Co., St. Louis, Mo., will furnish detailed information upon request.

Graybar's Silvrescent Unit

A new line of fluorescent lighting units has just been introduced by the Graybar Electric Company. Made by Silvray Lighting, Inc., Long Island City, and known as "Silvrescent" units, they are available for either suspension or ceiling mounting.

These new fluorescent fixtures feature scientifically designed diamond shaped reflectors paralleling the lamps. The high efficiency Polymerin surface has a reflection factor of 85%. In effect, this creates a "sheet of light" across the entire surface because there is a minimum



of contrast between the diamond reflectors and the lighted tubes. There is no interference with the direct upward and downward light from the tubes and that part of the light which must be reflected and redirected is controlled by surfaces which are compact in size and easy to clean.

Die-formed throughout, "Silvrescent" units provide for end-to-end installation in continuous rows. Eggcrate type louvre attachments, with a surface area only ½" deep, are furnished for each unit.

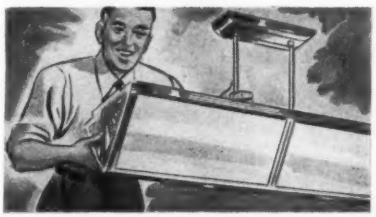
The Model 604 F. S. suspension type is a four-lamp, 200 watt unit. The body is 49" long, 13" wide and

Portrait of a Man Hanging Up a *PROFIT*...

—or why it will Pay You to *Specify* MITCHELL

Put yourself in this Fluorescent picture! MITCHELL fixtures are easier to sell, easier to install, surer to satisfy. Sell MITCHELL with confidence because you know your profits are protected . . . because you know MITCHELL quality is just like a bond that protects your reputation.

MITCHELL is Better Fluorescent Lighting —and you can prove it! Only MITCHELL fixtures carry this powerful Triple-Label: (1) Fleur-o-lier Certification; (2) Underwriters' Approval; (3) MITCHELL'S own complete Guarantee of Quality—a powerful 3-Way Guarantee that SELLS your customers!



You play safe when you install MITCHELL fixtures. They're designed better, engineered better, built better. Starting is swift, smooth, trouble-free. Installation is easier. Maintenance is simple. And that means fewer returns, greater customer satisfaction, and plenty of repeat business!

MITCHELL Better Lighting means more repeat business—heartier handshakes from your customers! Don't risk your reputation or your customer's good-will by taking chances with inferior fixtures. It will pay you in the long run to specify and install MITCHELL quality Fluorescent Fixtures. They satisfy!

MITCHELL offers you a complete Fluorescent line—a fixture for every Commercial and Industrial need. Send for Pocket Catalog No. 240 that shows you the most complete quality line of Fluorescent fixtures in the field . . . that helps you SELL!

Southern Rep.: WALTER NELSON
Bona Allen Bldg., Atlanta, Ga.

Model No. 2031. 200 WATT UNIT. Another new one! Uses four 40-watt, 48-inch lamps. Clear, ribbed diffusing glass panels; louvre bottom for greatest possible downlight. Satin-aluminum finish; chip-proof white enamel reflector. List Price, $46.50.

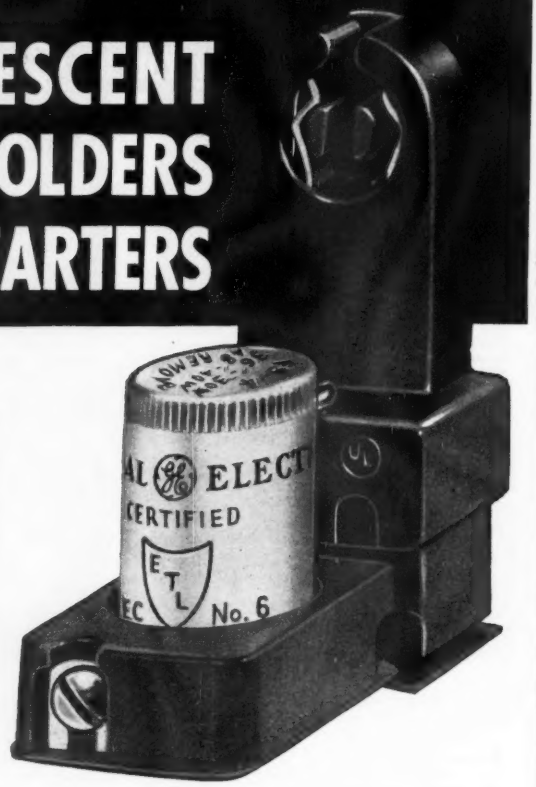
MITCHELL Fluorescent Fixtures are sold only through Franchised MITCHELL Lighting Division Distributors.

MITCHELL MANUFACTURING CO.
2525 N. Clybourn Ave., Chicago, Ill.

"A GREAT NAME IN LIGHTING"

Choose G-E

FLUORESCENT LAMPHOLDERS AND STARTERS



• You'll find the fluorescent lampholder or starter of the size and type you need for any job in the G-E line.

ROTATING LOCK LAMPHOLDERS

G-E rotating lock lampholders have positive holding power. A quarter turn in either direction locks the lamp so that it cannot be jolted or jarred loose. Another quarter turn in either direction frees the lamp—permits easy removal.

G-E STARTERS

G-E starters were designed by Mazda lamp engineers. These starters have correct operating characteristics to provide normal fluorescent lamp life and operation.

For further information see the nearest G-E Merchandise Distributor or write to Section D-1169, Appliance and Merchandise Dept., General Electric, Bridgeport, Conn.

GENERAL ELECTRIC

2" deep. Length of the bottom of the shield is 26". The 504 F. C. ceiling type differs only in that it is 12" wide and extends only 7" from the ceiling. Both units are said to be ideal for store, office and similar applications.

Further information about the new line of "Silvrescent" fluorescent lighting units, may be obtained by writing to the Graybar Electric Company, Graybar Building, New York, N. Y.

Curtis Silverline

A new type of fluorescent ceiling light is announced by Curtis Lighting, Inc., of Chicago, Ill. Designated as the "Silverline," this new fixture for use with a 5-foot 100-watt fluorescent lamp produces high intensity illumination on working or sales area even when mounted on high ceilings. The fixture was designed to be installed in continuous runs spaced no farther apart than the distance from the ceiling to the working plane. It has a lively attractive appearance against the ceiling because the exterior is softly lighted by a small portion of light.

The individual sections couple together to make up continuous runs, and feeder lines can be carried from one unit to another through the large capacity wiring channel. The fixture is easily maintained because of the absence of dust-collecting surfaces.

The fixture is made of steel with special baked aluminum finish having high reflecting efficiency and durability. One 100-watt lamp is required per section. When two sections are wired with two-lamp ballast, the total wattage for the two sections is 235 watts.

Wiremold Ballast Box

Wiremold Company announces a new box unit for large Tu-Lamp Fluorescent Ballasts. This steel box, (No. 30K01) to contain ballast and wiring, is designed to permit easy installation of the large cross-section tu-lamp ballasts in conjunction with Wiremold No. 3000 Fluorescent Lighting Channel and fittings. For further details write The Wiremold Company, Hartford, Conn.

New Bowl Refractor

A new pendent street light has been added to the Form 79 line, it has been announced by the General Electric Company. Designated the Form 79-VR, its principal feature is a new bowl refractor designed to provide more accurate control of the light distribution, and the resulting illumination on the street pavement.

The Form 79-VR will be made available with refractors having two-way and C-way distribution. With the two-way refractor which will normally be suspended over the center of the street, the light will be directed parallel with the street and away from the houses on both sides of the street. The C-way refractor will serve in similar fashion when mounted on a bracket at the side of the street, the light distribution be-

ing carefully "tailored" for this use.

The new luminaire retains the important constructional advantages of the Form 79 line, such as die-cast aluminum hood and the spun-sealed construction which makes the refractor a permanent part of the lumin-

aire. This latter feature cuts maintenance by preventing dirt and insects from entering the luminaire at the joint between the reflector and glassware, and also lengthens the life of the glassware by preventing the nicking and chipping which results in premature breakage with other type street lights.

Globe Flurolumes Announced

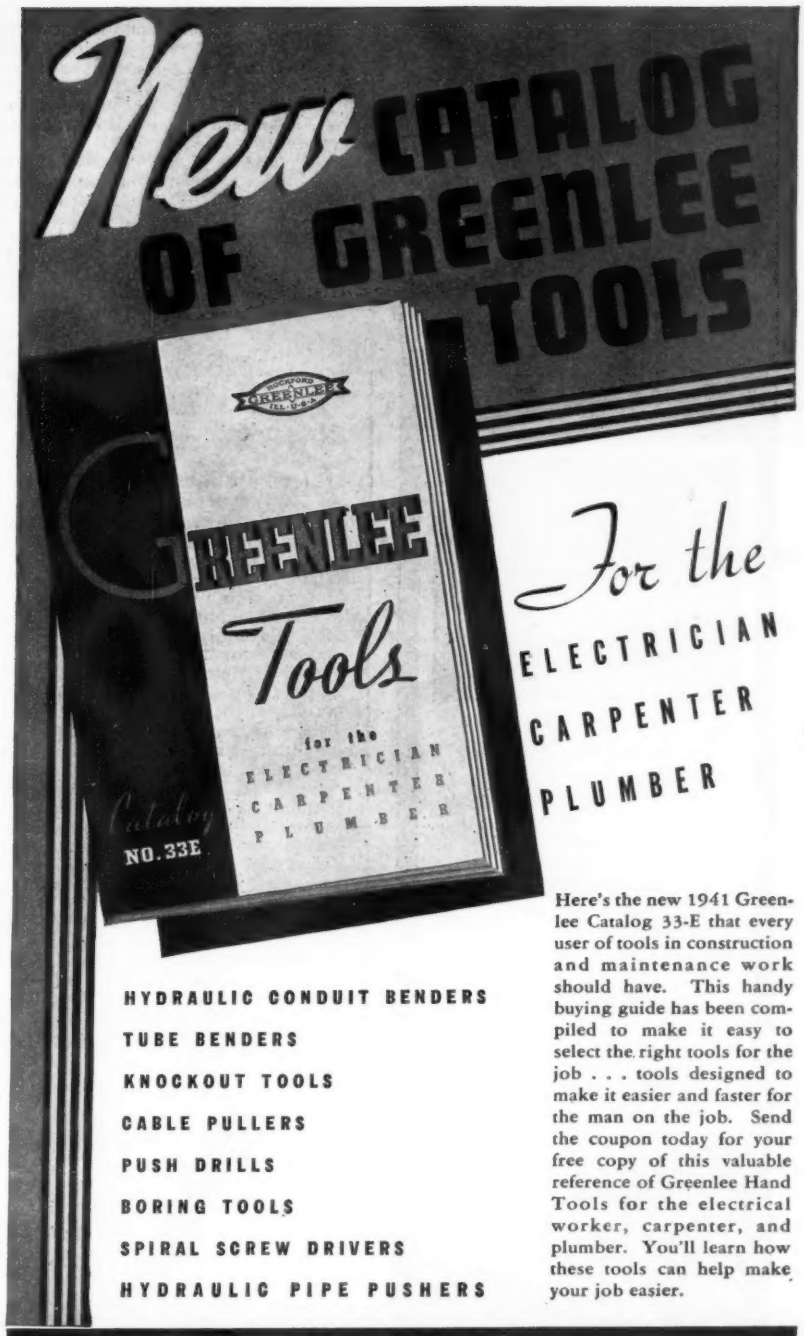
Several new fluorescent lighting units are announced by the Globe Metal Products Co., of Brooklyn, N. Y. One Globe Flurolume model has been designed for kitchen and bathroom use. It meets every requisite for handsome appearance, efficient lighting, durable construction, modern styling. Finished in chromium with a specially-processed baked white enamel reflecting surface. Carries two lights of 20 watts each; dimensions of body — 7" wide, 4¾" high, 26" long.

Another Flurolume fixture, No. KR-562-18, has been designed particularly for the illumination of halls, foyer or small bedroom in the modern home. Featuring the new, exclusive golden-tinted glass, it is finished in French gold with a specially processed baked white enamel reflecting surface. Has two lights, 15 watts. Body dimensions — 7" wide, 4¾" high, 20½" long.

Fluorescent Power Unit

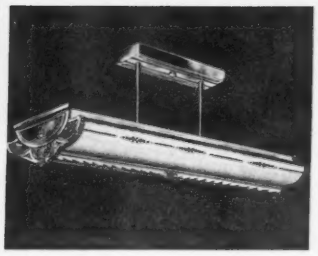
The use of the new National 999 Power Unit in fluorescent fixtures provides instantaneous light when switched on, even at lower temperatures and low line voltages, overcoming the usual waiting period for illumination. In addition, this unit eliminates the need for starters, starter switches, starter sockets and compensator, thus stabilizing lamp life and removing the major source of trouble in fluorescent lighting.

Operating on a patented, self-polarized, double circuit principle, the 999 Power Unit provides full brilliance, reduces stroboscopic effort (cyclic flicker) to a minimum, operates with exceptional quietness, has no radio interference and its power factor is corrected above 90 per cent.


New CATALOG OF GREENLEE TOOLS
GREENLEE
Tools
for the
ELECTRICIAN
CARPENTER
PLUMBER
Catalog
NO. 33E
For the
ELECTRICIAN
CARPENTER
PLUMBER
HYDRAULIC CONDUIT BENDERS
TUBE BENDERS
KNOCKOUT TOOLS
CABLE PULLERS
PUSH DRILLS
BORING TOOLS
SPIRAL SCREW DRIVERS
HYDRAULIC PIPE PUSHERS
Here's the new 1941 Greenlee Catalog 33-E that every user of tools in construction and maintenance work should have. This handy buying guide has been compiled to make it easy to select the right tools for the job . . . tools designed to make it easier and faster for the man on the job. Send the coupon today for your free copy of this valuable reference of Greenlee Hand Tools for the electrical worker, carpenter, and plumber. You'll learn how these tools can help make your job easier.
● SEND ME THE NEW GREENLEE CATALOG 33E
NAME
ADDRESS
CITY STATE
MY JOBBER IS
GREENLEE TOOL CO.
1707 COLUMBIA AVENUE • ROCKFORD, ILLINOIS

For the Last Word in Smart Fixtures See the New

GLOBE Lines



For more than 20 years the name Globe on a fixture has meant the utmost in lighting efficiency and smart styling. Fixtures for

FLUORESCENT
RESIDENTIAL
and COMMERCIAL USE.

When in New York Visit the New Globe* Showrooms

At
16 East 40th Street.

GLOBE
LIGHTING FIXTURE MFG. CO
Factory Brooklyn, N. Y.

* WHOLESALE ONLY

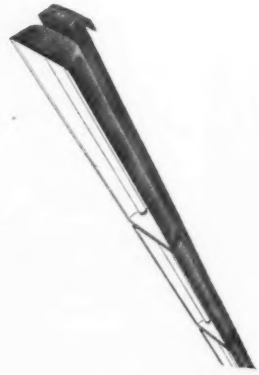
The unit is easily installed, guaranteed for one year and is so constructed that under no conditions can it overheat or be seriously damaged by overloading when connected to a circuit of the specified voltage and frequency.

The 999 Power Unit, used in conjunction with National Lampholders which automatically opens the primary circuit when lamps are removed, is listed and approved by the Underwriters' Laboratories, Inc., for use in fluorescent fixtures. The unit is now used in place of standard ballasts in many leading makes of fluorescent fixtures, which are available through reputable distributors and dealers. For further information, write the manufacturer, National Transformer Corporation, Paterson, N. J.

Miller "50 Foot Candler

About two years ago, The Miller Company, of Meriden, Conn., developed the first RLM Continuous Wireway Fluorescent Lighting System providing new higher levels of overhead illumination. Engineered into this equipment were many new and noteworthy features such as economy of operation; great savings in installation; ease of cleaning and maintenance; freedom to move floor equipment without disturbing lighting; and allowance for future lighting needs.

Because of these features, the Ivanhoe "50 Foot Candler" has been installed in many of the nation's major plants, on both direct and indirect defense work. There is, for example, a sizeable installation in the Springfield Armory at Springfield, Mass., working for Uncle Sam. There are "50 Foot Candler" installations throughout the aviation field, too, saving precious man-hours for Curtiss-Wright, Liberty Aircraft Products, American Air Lines, Fairchild Aerial Cameras and many other well-known people.



Perhaps more pertinent to the South are the installations in many leading textile mills. The Uxbridge Worsted Company is a particularly fine example. Accurate check-ups in their mills have shown them they were receiving benefits in the form of increased weaving efficiency on automobile fabrics with a decrease in rejects and mending costs. Their greatly increased illumination cost surprisingly little and mill operatives' production improved considerably under this better-seeing light.

In addition to the Ivanhoe "50 Foot Candler", The Miller Company offers a complete line of incandescent and fluorescent lighting equipment, backed by almost 100 years of commercial and industrial lighting specialization. In fact, their familiar slogan reads, "Pioneers in Good Lighting Since 1844."

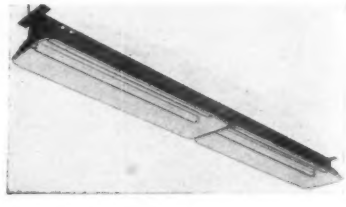
Wiremold Reflector Spacers

Fluorescent Show Case Reflector Spacers, designed to fill gaps between reflectors to provide a continuous reflector from one end of show case to the other when using Wiremold No. 2100 Fluorescent show case lighting equipment, are available in 3", 6" and 9" lengths with knock-outs to accommodate FS Starter Switches. They are manufactured by The Wiremold Company, Hartford, Conn.

Continuous Row Miralume

Hygrade announces a new line of Continuous Row Miralume fluorescent lighting units, designed to provide ultra-efficient lighting for industrial operations.

These units, designated F-104, F-208, F-154, and F-308, may be joined end to end with like units or with one another to form a continuous wireway enclosure. Miralumes F-104, F-208, F-154 and F-308, are supplied with end caps for individual mounting. Miralumes F-104J, F-208J, and F-308J are supplied with a connecting band for continuous row assembly. Thus, instead of providing a single electrical outlet for each unit, one outlet can be made to supply a row of units.



Like all industrial units in the Hygrade line, these new units are easily maintained. Reflectors are attached to the top housing by fittings which cannot break up or chip the high-quality porcelain reflecting surface, and starters are located in the top housing where they are easily accessible without removing the lamps.

Miralume F-104 is a 100-watt unit, complete with two 40-watt T-12 Hygrade Fluorescent Lamps. Miralume F-208 consists of two F-104 reflectors joined end to end on a single channel housing.

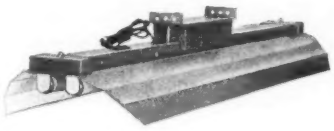
Miralume F-154 is a 150-watt unit, complete with three 40-watt T-12 Hygrade Fluorescent Lamps. Miralume F-308 consists of two F-154 reflectors joined end to end on a single channel housing.

All four units described above are equipped with Hygrade Dua-Lamp

high power factor auxiliaries and Hygrade Mirastat starters. Operating voltages—units available for 110-125 volts, 60 cycle A.C. Will be supplied in 50 cycle A.C. on request. For further details write the Hygrade Sylvania Corporation, Ipswich, Massachusetts.

Fostoria Canopy Model

Imagine operating a fluorescent lighting unit in the same manner as the conventional incandescent unit, and you have a quick picture of Fostoria Canopy — Model MF-240-N. Equipped with the new patented National Transformer "Power Unit" No. 999, approved by Underwriters' Laboratory, this latest Fostoria unit accommodates two 40-watt Mazda F lamps, and turns them on and off just like your incandescent Mazda lamps are turned on and off. And



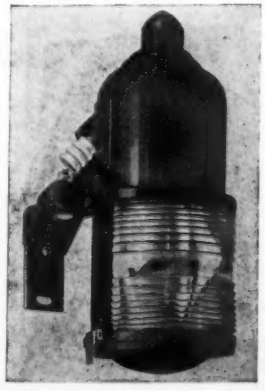
this instantaneous starting of the fluorescent lamps is accomplished without starting switches. Accordingly, switch replacement is avoided.

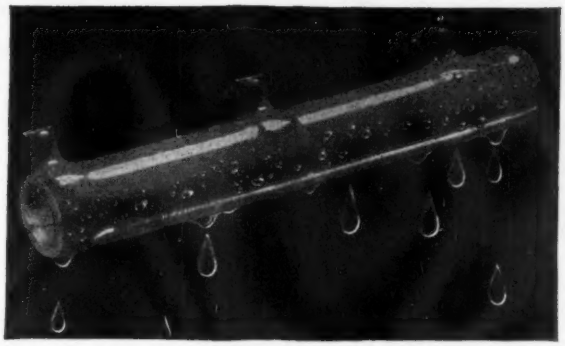
As if this instantaneous starting feature were not enough, Model MF-240-N stabilizes lamp life and thus reduces overall lamp costs. On top of this is the one year guarantee backed by both National Transformer and Fostoria.

Standard outside finish on Model MF-240-N is Hammered Cloud Grey enamel baked by the Near Infra-red Process—a finish which is permanent and "chip-proof." Optional finishes are Hammered Tan and Green, Wrinkle Grey, Brown and Black, and Gloss Grey, Green, Ivory, and White. Standard reflecting surface is the now famous Fostoria Baked Matte-White enamel. Optional reflecting surface is gloss white baked enamel. Both surfaces are easily cleaned.

New Defense Light

Revere Electric Mfg. Company, of Chicago, announces the perfection of a new type floodlight to answer the need for defense and protective lighting. The unit is made to produce





WHEN A RESISTOR SWEATS!

Moisture, visible or invisible, will cause trouble if it can penetrate the protective surface of a resistor. A microscopic examination of the surface of a Ward Leonard Vitreous Enamel Resistor will show why this Resistor is able to give satisfactory service under all climatic conditions. Its freedom from even minute enamel crazes or cracks is unique. With such complete protection of the wire, moisture is effectively excluded. The Vitreous Enamel of Ward Leonard Resistors is processed at a temperature above 1400°F. Thus all elements of the enamel are perfectly fused and envelop the wire in a sealed, protective, glass-like enclosure.

Send for bulletins of interest:

Southern Representatives:

John S. Clark, 1100 E. Missouri St., Box 143, Station A, El Paso, Texas
C. B. Rogers, Zahner Building, 1000 Peachtree St., N.E., Atlanta, Ga.
Brance-Krachy Co., 4411 Navigation Bldg., Houston, Texas
Electron Engineering Co., 1811 Masonic Temple, New Orleans, La.

WARD LEONARD

37 SOUTH STREET — MOUNT VERNON, N. Y.

ELECTRIC CONTROL DEVICES SINCE 1892

Yours for the asking—

—a book that will help you sell!

It's the new 84-page

GROSS Lighting Fixture Catalog

It is complete — profusely illustrated — and well arranged with descriptive information as to classifications, etc. You will find it helpful in showing your customers what they should have — and you don't have to carry a big stock of fixtures to do it. Lots of folks are buying fixtures these days. This book will help you get their orders.

And don't overlook the profit opportunities in

GROSS
***Certified* FLEUR-O-LIERS**

Backed by 35 years of lighting experience and a long period of research and survey, Gross Fluorescent Fixtures surpass even Fleur-o-lier's rigid specifications. They meet the needs of stores, offices, schools — everywhere that pleasant, glare-free illumination is desirable. Pleasing decorations and fine finishes add to their mechanical advantages. You'll find them fully described in the new catalog. Write for one today... Gross Chandelier Company, St. Louis, Mo.

Clip and Mail This Coupon Today!

GROSS CHANDELIER CO.,
2036 Delmar Blvd., St. Louis, Mo.

Please mail the new Gross Lighting Fixture Catalog to

Name.....

Company.....

Street and No.....

City.....State.....

Supporting Industry

POWER!

QUICK
EFFICIENT
CHANGEABLE
FLEXIBLE

Gorilla Grips

Stock inventory sets including all popular types of connectors. Nuts fit each type and take 19 wire sizes. At finger tips—low investment—convenient.

National Electric
PRODUCTS CORPORATION
300 FULTON BLDG., PITTSBURGH, PA.

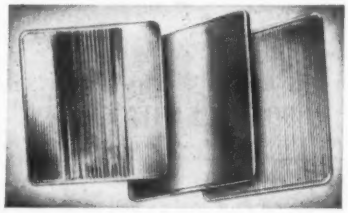
a light-beam pancake in shape, throwing the light across fences surrounding ordnance plants as well as areas adjacent to Industrial Properties, yards, docks, oil refineries, etc.

It is of rugged construction for multiple or series circuit use, employing a 180° fresnel lens made of heat-resisting glass. The cast iron housing is dust-tight and weatherproof. Focusing mechanism is externally operated. The glare produced is of such strength as to blind any intruder approaching the lighted area while the guard inside the fence can see every move without being detected.

Further particulars may be had by addressing the manufacturer at 2949 N. Paulina St., Chicago.

Holophane Controlenses

The means are now available for controlled fluorescent lighting. The Holophane Company is now manufacturing three prismatic glass lenses known as fluorescent Controlenses. These Controlenses, when used with fluorescent fixtures, meeting the optical design specifications established by the Holophane Engineering Department, will produce three basic lighting distribution patterns.

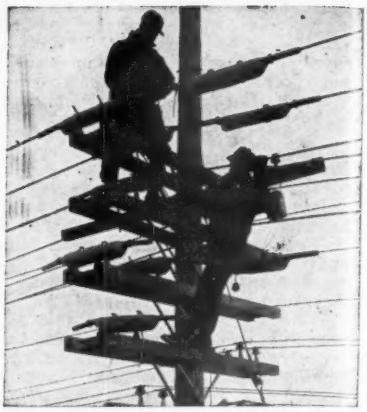


The first, known as the Intensive Controlens, produces the distribution of light most commonly used in both commercial and industrial interiors —normal "uniform spacing" lighting of horizontal surfaces in rooms of normal height.

The second, Concentrating Controlens, produces a rigidly confined focusing type of light distribution. This lens has several common applications —accent lighting, general illumination from great mounting heights, or "offset beam" lighting.

The third, the Extensive Controlens, is particularly adaptable for areas where the lighting of vertical surfaces is desired or in low ceiling areas to permit economical wide spacing of units.

Complete fluorescent lighting fixtures using Holophane Controlenses are available from a number of nationally known and reputable fixture manufacturers. These fixtures are for three types of installation, recessed flush-with-the-ceiling, "close up" to the ceiling, and for suspension mounting. These fixtures are designated as Controlescent fixtures and these manufacturers are known as Controlescent manufacturers. This means that their designs have been authorized and approved for excellent and efficient lighting results by the Holophane Engineering Department. A 16-page book in color is available by addressing the Holophane Company, 342 Madison Avenue, New York City.



Complete Protection in a Single Unit

It is paying many utilities to discard all damaged linemen shields and replace them with MARSHALL'S ONE PIECE LINEMEN'S SHIELDS. They cover both insulators on double cross arm repair jobs with but a single application.

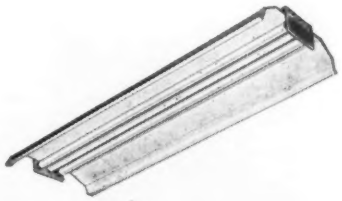
During the quarter of a century that they have been on the market, there has never been a loss of life among its many users and over 1000 utilities have now standardized on MARSHALL'S.

A line to Linemen Protector Company, 1744 W. Alexandrine, Detroit, Mich., will bring prices and full information.

MARSHALL'S LINEMEN'S SHIELDS

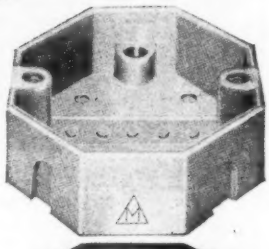
Wilson "Large Area" Fixtures

The new Wilson "Large Area" Fluoro-Fixtures, incorporating the patented "Duo-Flector" principle, are ideally suited for use in factories, laboratories, offices, and shops. The highly efficient reflector shape has the new 77 degree angle of cut-off which gives a broad field of illumination, while the inner "V" reflector provides the necessary downward concentration of light. The entire reflector is finished with Wilcite chip-proof baked on white enamel, and may be had with the inner "V" reflector in either specular Alzak or Wilcite. The outer finish is a rich satin silver lacquer.



The broad reflector is entirely independent of the wiring system, and may be removed for cleaning or maintenance without disturbing the wiring system in any way. This method of reflector mounting makes this type of fixture ideally suited for flush or recessed mounting. The open end design eliminates end shadow, and the entire fixture design

THE INSIDE STORY of ILLINOIS PORCELAIN



OUTLET BOXES

Glazed and unglazed styles conforming to all existing standards of dimensions, spacing, position of knockout holes, and mounting screws. High mechanical and electrical efficiency.

STANDARD TUBES

In sizes ½ to 48 inches long, ⅛ to 3 inch diameter in following types: unglazed, glazed, split, floor, split floor, headless, curved end, crossover split, and crossover. Diameters all uniform both inside and outside.

SWITCH BOXES

Insure greater safety in wiring and the elimination of all grounding hazards. Made of best quality white porcelain. Metal inserts are placed in two holes of the switch boxes for receiving screws of standard switches, plug outlets, etc. Knockouts for single wires, also for cables. Specify and use them.

KNOBS

Cement coated — nail — genuine leather washer — code Standard. They don't chip when driven in and they do stay in place and have a firm grip.

1. Illinois scientifically controls the batch for uniformity in Insulators.

2. Illinois eliminates internal stress in porcelain thru vacuum type pugg mill.

3. Illinois insures exact dimensions through profile control.

4. Accurate Illinois kiln firing prevents strains in porcelain.

Standardize on

ILLINOIS PORCELAIN

TOP QUALITY - - - EXACT DIMENSIONS

ILLINOIS ELECTRIC PORCELAIN CO. **MACOMB, ILLINOIS**

Lloyd Policy Insures Quality

No Gambling

with

LLOYD

Lamp Holders

Cat. 251
Black

Cat. 251-W
White

Pat. Pend.

The Lamp Can't Jar Loose

Easy to install.

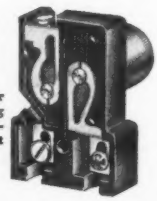
Lamp held securely locked — in positive contact.

Easy to remove lamp.

LLOYD
Starter Socket
Cat. 252

With unique "Lobster Claw" Dual Spring Lock. Insures a contact which cannot loosen.

Pat. Pend.



LLOYD STARTERS

Quick Starting—Longer Life—several times standard specifications.
FS-2 for 15 and 20-watt lamps
FS-4 for 30 and 40-watt lamps
Certified by Electrical Testing Laboratories—Spec. 6

FS-6 for 100-watt lamps

All Lloyd Products

Listed and Approved by Underwriters' Laboratories Inc.

LLOYD
PRODUCTS COMPANY
Providence, Rhode Island
Representatives in 22 leading cities

provides light distribution and effectiveness not found in any other industrial style fixture. Rigid end socket supports provide complete protection to the lamp holders, and eliminate all possibilities of accidental breakage. Takes two T-12 48" 40-watt fluorescent lamps, supplied in either 110/125 volt or 220/250 volt fixtures. Provided with loops for chain suspension, and 6 feet of three-conductor ground cord. For further information and prices, write to Wilson Lighting Inc., 152-156 West Erie St., Chicago, Illinois.

Wakefield "Ace" Unit

The latest fixture development of F. W. Wakefield Brass Company, Vermilion, Ohio, is the new fluorescent unit designated as "The Ace." This new unit comes in two sizes, one for four 40-watt lamps and the other for six 40-watt lamps. It has a pleasing appearance of satin cadmium and baked white enamel finish. The unit is designed for the direct distribution of light, approximately 90 per cent being directed downward. Small indirect component serves to light the ceiling area. Adequate louvers prevent direct view of the lamp.

Maintenance is simplified by the fact that important reflecting surfaces all face downward.

La Salle Wallamp Catalog

A new 1941-42 Wallamp catalog has just been issued by La Salle Lighting Products, Inc., Buffalo, N. Y. Among new developments in it is a new easy-to-nail hanger that holds the Wallamp firm and straight on the wall. Another is the introduction of two-tone finishes for Wallamps. Popular in the automotive field, two-tone finishes for Wallamps should enjoy enthusiastic acceptance. "Stay-Nu" enamel finishes, electrically baked at high temperature for extra hardness and durability, are another new feature—an improvement that adds to the useful life of the Wallamp without increasing the selling price.

Weatherproof Outlet

A new single weatherproof outlet with rubber cap is announced by Pass & Seymour, Inc., Syracuse N. Y. Completely weatherproof, this new outlet is sealed with plate gasket and rubber cap. The rubber cap is designed so that it may be gripped firmly by thumb and forefinger for easy

insertion and removal. The .040" brass plate has an attractive baked-on aluminum finish. This device incorporates the standard P&S-Despard 1320 outlet having constant tension contacts which grip both sides of the plug blades. It may be installed in

HERWIG
FIXTURES

are easy to sell as they are in demand for all kinds of buildings and are specified by leading Architects and United States Government.

OVER THIRTY YEARS' EXPERIENCE

OUT-DOOR
LIGHTING FIXTURES

Apartment Buildings
Public Buildings
Bungalows
Churches
Schools
Garages
Country Clubs
Warehouses
Residences

A FIXTURE FOR EVERY OUTDOOR PURPOSE

Send for our
CATALOGUE NO. 40
with NEW SUPPLEMENT
and REVISED PRICE LIST
200 Illustrations

The Herwig Company
MANUFACTURERS
Established 1908
1753-59 Sedgwick Street
Chicago, Illinois, U. S. A.

AVOID DELAYS
SPEED-UP PROFITS

IDEAL Wire-Nuts

Solderless, Tapeless, Wire Connectors

STRIP WIRES — SCREW ON — THAT'S ALL!

Cut wiring costs on installations of Fluorescents and other electrical wiring—with **Ideal** "Wire-Nuts." No solder, no tape, no open-flame torch. Millions In Use.

Free Samples On Request

Fully Approved — Listed By Underwriters' Laboratories, Inc.

NEW

IDEAL WIRE AND CABLE REEL

No more time-wasting snarls. Wire always kept neatly coiled. Can be run out smoothly and evenly as desired. Handles coils 3" to 14" dia., insulated wire from No. 18 to No. 2, cord, cable, Romex, etc. Hang singly or in tandem from pipe, joist or beam. Inexpensive!

IDEAL SOLD THROUGH JOBBERS

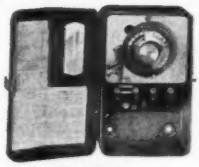
IDEAL COMMUTATOR DRESSER COMPANY
1017 Park Avenue Sycamore, Illinois
"SALES OFFICES IN ALL PRINCIPAL CITIES"

IT'S TIME TO SWITCH TO Paragon

. . . especially to **PARAGON 300 SERIES TIME SWITCHES** — leaders in a group of precision built time switches, resulting from 36 years of research and progressive manufacturing.

SERIES 300 is ideal for signs and general time switch applications, for day-night control of stokers, oil burners, gas burners, signs, commercial lights, attic fans, blowers, pumps, valves, motors, etc.

Just 2 exposed gears; all other gears operate in an oil filled chamber; absolutely dust-proof. 2000% extra dial power. 18 gauge steel case.



300 SERIES

Many other types available. Send for a complete catalogue. . . .

PARAGON ELECTRIC CO., 409 So. Dearborn Street, Chicago, Ill.

Southern Representatives

William E. Hopper
357 Marietta Street, N. W.
Atlanta, Georgia

George E. Anderson Co.
Santa Fe Building
Dallas, Texas

Large Stocks for Immediate Shipment in Atlanta and Dallas

Paragon Chicago

BUILDERS OF CONTROL INSTRUMENTS SINCE 1905

Every HOME NEEDS THIS *SIGNAL Vent* FAN ····

Wall Box built-in type for permanent installation—can be installed in new or old homes. Telescopic in design to fit walls 6" to 24". It is today's No. 1 Kitchen Vent Fan Value.

Automatic lever-operated shutters and these other important features warrant your consideration: Totally enclosed motor—rubber motor mounting—10" quiet type fan—telescopic adjuster for walls—detachable plug—inside door for weather protection—opening and closing door operates motor and shutters—cast iron outside frame—close fitting shutters—large wool-packed oil reservoirs—inside white baked enamel finish. Complete details are yours for the asking.

SIGNAL ELECTRIC MFG. CO.

MENOMINEE, MICHIGAN

Branch Offices:
W. E. Hopper
357-59 Marietta St., Atlanta, Ga.
Geo. E. Anderson
Santa Fe Bldg., Dallas, Texas

SIGNAL

ONLY SEPCO

Has These Three SALES BOOSTERS

1. *Hi-speed, No-burn-out Unit*—Rapid heating due to internal circulation. Operates at "black heat," insuring long life and retarding scale formation in hard water.

2. *Fibreglas Insulation*—absolutely fire, vermin, and moisture proof—the most efficient insulating material obtainable.

3. *Vapor Tension Thermostat* — subjected to severe tests representing 50 years of service; a rugged, thoroughly reliable, accurate temperature regulator.

Add SEPCO'S economy, convenience, dependability, attractiveness, and attention-free service, and you can see why the SEPCO line almost sells itself through the enthusiastic recommendations of users. Completely automatic, clean, safe, cool and quiet, it's the electric water heater that can build a volume of business for you. Ask for your copy of the new illustrated SEPCO folder today.

14 Distributors Serving the South

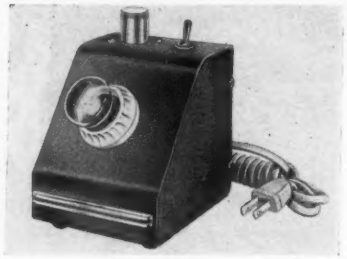
AUTOMATIC ELECTRIC HEATER COMPANY

POTTSTOWN, PA.

a single gang switch box or flat face FS fitting. Rating—15 amperes, 125 volts; 10 amperes, 250 volts.

Fedco Starter Tester

The Fedco Fluorescent Starter Switch Tester, a development of the Federal Engineering Company, 113-31 Farmers Blvd., St. Albans, N. Y., is now being offered the trade. The



unit is designed for placing on the counter and readily checks both 15-20 and 30-40 watt starters of all standard types. Complete details are available upon request.

Kliegl Brothers Folders

Two new folders—concise, factual, and timely—give detailed information on what's new in Kliegl lighting equipment, and their applications to lighting stage presentations, auditoriums, and theatres. Bulletin No. 41 features permanent equipment; No. 46 portable equipment and supplies. Copies gratis on request to Kliegl Brothers, 321 West 50th St., New York, N. Y.

New Infra-Red Heat Lamps

Three new infra-red heat lamps will be placed on the market May 15th, by the Birdseye Division of Wabash Appliance Corporation, Brooklyn, N. Y. Two of the lamps will be clear, for use with the standard gold-plated or Alzac reflectors, but the third will not require any separate reflector since it will be built with its own reflector lining sealed inside to keep it free from oxidation and the collection of dust, dirt and fumes. The manufacturer states that the reflector lining will keep heat-reflecting value for the 6,000 hour life of the bulb because it will be made of pure solid silver which will be sealed inside the gas-filled bulb.

Differing from incandescent lamps used for lighting, the filaments of the Birdseye infra-red lamps operate at lower temperatures, developing infra-red radiant energy at wave lengths which have high penetration. The unique property of these lamps and of infra-red radiant energy developed is their uncanny ability to penetrate deep down into the surface films of lacquers, paints and enamels to start the baking and drying process from the inside out, instantly, and uniformly.

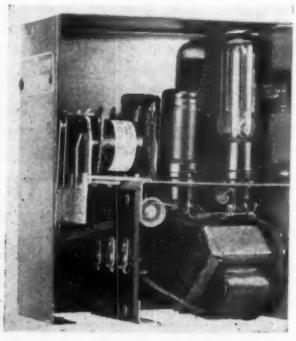
Complete information on Birdseye heat lamps and on the subject of baking, drying and dehydrating with infra-red radiant energy is contained in bulletin No. 121B just issued by the Wabash Appliance Corporation, Brooklyn, N. Y.

Automatic Street Lamps

Latest contribution to safer night driving is a new sodium luminaire that turns itself on and off. Intended for safety lighting of highway intersections, grade crossings, underpasses, and similar danger points on streets and highways, a built-in "electric eye," or phototube control, recognizes the approach of twilight, when the accident hazard reaches a maximum, and turns on the lamp. Similarly, the break of day signals the control to turn off the lamps.

According to General Electric engineers who developed this self-controlled safety luminaire, the illumination of such danger points on streets and highways is capable of conspicuous reduction in traffic accidents. The simplicity of installation and operation afforded by this "electric eye" luminaire makes it easier than ever before to effectively light them; in most cases the unit improves the certainty that the lighting will be in operation when needed for safe driving.

The luminaire is an open sodium luminaire of a type very commonly employed for highway, bridge, and hazard-point lighting. It uses a 10,000-lumen lamp, producing about the



TELESCOPE BM SYSTEM

MORE PROFIT AND LESS TIME ON EVERY INSTALLATION

B-M CONNECTORS AND COUPLINGS

Save you up to 25% on material and up to 50% on connecting time. POPULAR—because it's the SIMPLE, EASY METHOD of making installations. Permits stronger, neater connections since it eliminates complications and ends fussing with nuts to tighten.

ONLY ONE TOOL NEEDED

Costs you only $1.25 for the patented B-M indenter (½" size handles 80% of all installations). Just two squeezes, and you have a smooth, neat connection. No other tools required. This tool can save you many times its cost on the first job.

Distributed by

The M. B. Austin Co. Chicago, Ill.
General Electric Co. Bridgeport, Conn.
Clayton Mark & Co. Evanston, Ill.
The Steelduct Co. Youngstown, Ohio
Clifton Conduit Co. Jersey City, N. J.
Enameled Metals Pittsburgh, Pa.
National Enameling & Mfg. Co. Pittsburgh, Pa.
Triangle Conduit & Cable Co. Elmhurst, New York City

Approved by Underwriters' Laboratories

STRONG, NEAT CONNECTIONS

You welcome the speed and ease that the B-M system puts in your hands. These fittings give you complete, well finished work in a hurry—(not water-tight).

BRIEGEL METHOD TOOL CO., Galva, Ill.

INSTANTANEOUS *Electric* HEATERS

HOT or COLD WATER from the SAME FAUCET—when you want it.

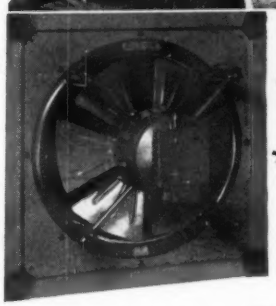
• • • The Instantaneous Electric Water Heater is not a portable lamp socket device, but—as shown—is a compact, self-contained apparatus (10½x4¼ inches). Quickly and inexpensively installed. Operates on AC.

Approved by Underwriters Laboratories, Inc.

DISTRIBUTORS WANTED

Mfg. By THE ELECTRIC HEATER COMPANY
BRIDGEPORT, CONNECTICUT, U. S. A.

THEY'LL HELP YOU LAND THE JOB!



WELDED CONSTRUCTION
EASY INSTALLATION
LIGHT WEIGHT
16 GAUGE METAL BLADES
FAMOUS STURTEVANT ENGINEERING

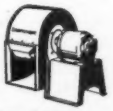
ONLY Sturtevant GIVES YOU ALL THESE!

Wind-O-Vane Fan

Pressure Blower

Atticvane Fan

Wallvane Fan


Ventilating Set

You get the last word in ventilating fan construction—when you specify Sturtevant.

You get the product of the World's Largest Manufacturers of Air Handling Equipment.

You get all of the advantages which only 81 years of air engineering experience can assure.

Sturtevant
REG. U. S. PAT. OFF.
Puts Air to Work

B. F. STURTEVANT COMPANY
Main Office and Works: Hyde Park, Boston, Mass.

Stocked and Distributed by:

NOLAND COMPANY, INC.

Durham, N. C.
Raleigh, N. C.
Winston-Salem, N.C.
Chattanooga, Tenn.
Birmingham, Ala.
Montgomery, Ala.
Newport News, Va.
Norfolk, Va.
Richmond, Va.
Lynchburg, Va.
Rosslyn, Va.
Roanoke, Va.
Columbia, S. C.
Spartanburg, S. C.
Washington, D. C.
Hagerstown, Md.
Atlanta, Ga.
Macon, Ga.

THE SALES PRICE

of an article is often from two to ten times its cost to manufacture.

That one fact indicates the opportunities to increase sales and profits through better distribution and merchandising.

ELECTRICAL SOUTH, through its editorial pages, points the way along constructive lines and presents information, ideas, and plans based on the intimate contact of its editorial staff with the electrical utilities, dealers, and contractors of the South. Coming issues will contain many important merchandising articles relating to sales training, demonstrations, canvassing, appliance servicing, and displays; engineering features describing modern trends in transmission, distribution, and utilization; and many items of special interest to electrical contractors on both practical and technical subjects.

Take advantage of these valuable articles by reading your copy of ELECTRICAL SOUTH carefully each month. If you are not already a subscriber, it costs only $1.00 *for one year or* $2.00 *for three years.*

ELECTRICAL SOUTH
GRANT BUILDING ATLANTA, GA.

Sherman CONNECTORS

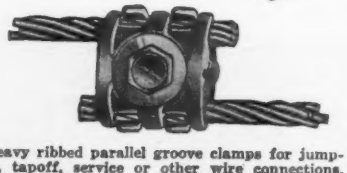
Sherman solderless wire connectors and clamps are practical, efficient, easy to install, and surprisingly moderate in cost. Every item has been designed and built to meet the specific needs of the Electrical Industry.

You can cut costs and reduce inventories by standardizing on Sherman.

Today's finest Split Bolt Connector. Precision machined from high strength corrosion resistant bronze.

Wedge Grip Connectors that provide extra wedging and snubbing action. Pure copper, non-removable screw.

The popular "Bond-Rod" ground clamp for driven ground rods. Heavy extruded bronze. Bronze screw with cup point. Strong one-piece construction.



Heavy ribbed parallel groove clamps for jumper, tapoff, service or other wire connections. Made in a range of types, for Copper, ACSR or Galvanized Steel Strand connections.

New type Armor Rod Clamp for making tapoffs over ACSR Armor Rods. Unique interlocking construction. Quickly installed without removing bolt.

Free! New Catalog and Samples

H. B. SHERMAN MFG. CO.

26 Barney Street

BATTLE CREEK, MICHIGAN

same volume of light as a 500-watt incandescent lamp but using only half the power and having a distinctive golden yellow "caution" color. The lamp is mounted horizontally in an arrangement of Alzak-finished aluminum reflectors producing a scientifically correct pattern of light distribution efficiently. The "electric eye" and associated equipment to operate the lamp automatically from an ordinary 120-volt, 60-cycle power supply are located in a compartment on the back, or pole-side, of the luminaire.

The control is preadjusted at the factory for excellent sensitivity and is compensated against flashes of light (lightning, for example) that might affect the operation.

Reliance Time Switch

Reliance Automatic Lighting Co., Racine, Wis., announces an astronomic dial is now available on the single and double pole, single circuit types of this manufacturer's Model W time switch. Advantage of the new astronomic switch over standard types is that it automatically advances or retards the "on" trip each day, thus eliminating any manual resetting of the dial as the days become longer or shorter. The only attention necessary is to throw the reversing lever twice each year, on about June 21 and December 11.

Latitude and longitude corrections, according to geographical location where the switch will be used, are made at the factory. The switch is powered by a slow speed, self-starting synchronous motor which consumes less than three watts. Case of 20 gauge steel has four ½"x¾" combination knockouts, measures 4"x7"x 4". Switch contacts are pure silver. Approved by Underwriters' Laboratories for 30 amps. 125/250 volts, this time switch is an ideal control for lighting circuits in show windows and apartment buildings, also for neon signs and billboards.

Modern Lighting for Merchandisers

(Continued from page 87)

appeal than the comparatively dull incandescent orange and red.

The following table gives the approximate lumen output figures for 15 watt incandescent lamps as compared to 15 watt fluorescent:

Color	Inc.	Flu.
Blue	.56	315.0
Red	8.00	45.0
Green	4.9	900.0
Yellow	72.8 (Gold)	375.0

The use of color in display of merchandise presents many critical and dangerous problems and only the best qualified of display men should attempt to handle them. If correctly used, colored illumination can increase the potency of a display of merchandise many hundred fold but if incorrectly used, it can ruin an otherwise excellent setup. For years the theatre has made use of color to create moods and effects with great success. In the final analysis, a show case or a show window is a stage set to create the urge to purchase something displayed therein and in many instances the intelligent and careful use of fluorescent colors can be very helpful.

A third characteristic of fluorescent lamps which makes them so widely acceptable to retail store management is their relatively low surface brilliancy. The

ST. LOUIS
COOL COMFORT
Hotel
Mayfair
ALL ROOMS AIR-CONDITIONED
In St. Louis, Hotel Mayfair is the choice of seasoned travelers. They appreciate its downtown location . . . enjoy its friendly, restful atmosphere, courteous service, comfortable rooms and its restaurants where fine food and drink are traditional.
Every room is noiseproofed . . . has private bath, ice water, radio and guest-controlled air-conditioning. Rates: over 50% of all rooms $3.50 or less, single; $5.00 or less, double.
HOTEL
Mayfair
Eighth & St. Charles • St. Louis, Mo.
Nearby Parking and Garages

Dolph's

*Synthite INSULATING VARNISHES

FOR DEFENSE WORK

Whether for insulation of heavy duty motors, dynamotors, transformers or for insulation of lighter electrical equipment for use in control of airplanes, submarines or fire control apparatus, DOLPH'S SYNTHITE Insulating Varnishes have met the rigid specifications set up by the Government and many leading manufacturers of electrical products.

FOR YOUR WORK

You may not have any direct defense contracts but your work should be afforded the same protection as that demanded by industry engaged in defense work. SYNTHITE Insulating Varnishes will effect considerable savings in your production and at the same time contribute greatly to the quality built in your product.

Why not write today and investigate the advantages to you in using SYNTHITE Insulating Varnishes.

JOHN C. DOLPH CO.

Insulating Varnish Specialists

166 Emmett St. Newark, N.J.

(*Reg. U. S. Pat. Off.)

Replacements in a single service call

WITH CHROMALOX RANGE UNITS

New profits for you and your salesmen. A large percentage of the homes using electric ranges, need one or more unit replacements. Make them Chromalox units. Equip each salesman with one or two units and a few adaptor rings. Make replacements on the spot. Write for details.

See nearest representative

ATLANTA, Ga.—C. B. Rogers, 1000 Peachtree St.
DALLAS, Texas—L. R. Ward 401 Southland Life Bldg. Annex
RALEIGH, N. C.—W. R. Phillips
OKLAHOMA CITY, Okla.—Paul Berry, 3128 N. W. 26 St.

EDWIN L. WIEGAND CO., 7600 Thomas Blvd., Pittsburgh, Pa.

Double Opportunities for Profit

SELLING AND INSTALLING AUTOMATIC POULTRY TIME SWITCHES *for Poultry House Lighting*

Every poultry raiser has been sold on the idea of using lights in his poultry house during the winter to increase egg production and profit. They all want Time Switches! SELL THEM! CASH IN ON THIS PROFITABLE MARKET.

Five Models — $3.95 to $18

With and without "dimmer" circuit. All-electric or manually wound.

Write for Information.

Automatic Electric Mfg. Co. Mankato, Minn.

38,000 FEET OF PLUGMOLD on ONE job!!

Typical bedroom in Henry Grady Hotel. Note how inconspicuous PLUGMOLD appears when painted to match walls.

At the Henry Grady Hotel PLUGMOLD was easily connected to existing boxes and installed between baseboard and molding.

PLUGMOLD is quickly installed. Sufficient slack in wires permits proper and easy location of receptacles.

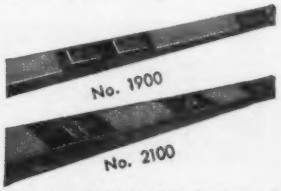
That's Nice Business

Mr. Contractor . .

PLUGMOLD . . . 38,000 feet of it . . . used when Atlanta's Henry Grady Hotel recently rewired 500 rooms! That's profitable business, and there are opportunities like that right in your own territory, not only in hotels but in offices, stores, factories and homes.

In fact, wherever electricity is used for lights, for appliances, for small hand tools or office machines, there is need for the time-saving convenience and greater safety of PLUGMOLD . . . the simple, flexible Wiremold Plug-in-Anywere Wiring System that permits installation of all the outlets required in exactly the right places. Plugmold becomes a permanent part of the interior trim.

Be prepared to get your share of this business. Write today for new Plugmold Literature.



No. 1900 PLUGMOLD for general use: No. 2100 PLUGMOLD for switch controlled circuits and for use in offices, factories, stores etc.

THE WIREMOLD COMPANY
HARTFORD, CONN.

SPEEDY and Efficient Communication is an Essential in any plant today.

Couch offers a wide range of Private Telephones — with a system to meet practically any requirement from a 2-station set-up to a 50-line automatic system.

Every 'phone has a background of nearly 50 years of telephone manufacturing experience back of it.

—Write for Catalog—

S. H. COUCH COMPANY, INC.
NORTH QUINCY, MASS.
Sales Offices in Principal Cities
Established 1894

—Manufacturers—
Fire Alarms — Bells
Annunciators — Cables
Blake Staples — Code Call

fixture brightness factor is one which should be carefully considered when designing an installation, if maximum value is to be obtained. When customers enter a store their attention should be drawn to the merchandise for sale and not to lighting fixtures which are usually conspicuous because they are bright. Incandescent lamps are concentrated sources of high brightness and the necessity for shielding them is, of course, unquestioned, but since the introduction of fluorescent lamps there has been considerable discussion among illuminating engineers regarding premissible brightness limits. This is due to the fact that the surface brightness of fluorescent lamps seems to be about on the border line.

Surface brightness is measured in light power per unit of area and is usually expressed in foot-lamberts, or candles per square inch. For the sake of comparison and to complete an understanding of the term, the surface brightness of the sun is about 1,000,000 candles per square inch; a 100-watt inside frosted lamp, 110; a candle flame, 9.5; the full moon on a clear night, 3.3; and the blue sky with scattered clouds will range from 1 to 20 candles per square inch. Two and one-half candles per square inch have been generally considered as the maximum brightness that can be viewed with comfort for extended periods by the average person under ordinary conditions of contrast. However, with the higher levels of illumination which are becoming more and more general through the application of fluorescent lamps, somewhat higher brightness levels can be tolerated in areas where the contrast conditions are not too severe. The surface brightness of standard fluorescent lamps ranges from about 3.5 to 5.5 candles per square inch, depending upon the color, lamp size, and diameter so that moderate shieding in the form of louvers, thin plastic, or glass will suffice when a brightness level lower than existing with bare fluorescent lamps is desirable.

Two other characteristics of fluorescent lamps which make them particularly adaptable to merchandising are their relative coolness per unit of light and their long length. While these factors are quite important in the design of a general lighting system, their real value lies in show case and wall case lighting. The abundance of heat generated by incandescent lamps in the confined areas of show cases has created a real problem where delicate or perishable merchandise has been displayed. Usually the result was to eliminate the case lighting entirely with detrimental effects upon sales. With fluorescent lamps producing much less heat for the same quantity of light, these problems have been satisfactorily solved.

The day when merchants could think of lighting as a non-productive expense, like sweeping or stock-taking, is long past. At the very least, good illumination is a service to the custmer, something the patrons have a right to expect. At the best, store lighting is a positive selling force of as much importance as sales clerks and as directly productive of sales and profits. Fluorescent lighting, either for general store illumination or localized display, is consistent with the tempo of today's living. It is a mark of modern merchandising.

You'll like the Lennox in St. Louis, too. Here in a handy downtown location, you'll find cheery, comfortable surroundings . . . sleep-inviting beds, famous food and drink . . . everything to make your stay pleasant.

All rooms are noiseproofed . . . have private bath, radio and guest-controlled air-conditioning. Rates: 50% of all rooms $3.50 or less, single; $5.00 or less, double.

HOTEL
Lennox
9th & Washington • St. Louis, Mo.
Nearby Parking and Garages

TIMED TO THE MINUTE . . .

the VICTORY *model*

GLASS COFFEE MAKER

Equipped with the standard Silex patented Spring Tension Filter that insures crystal clear coffee every time. Semi-wide neck, good pouring, easy cleaning.

Genuine SILEX
at lowest price in Silex history

$2.45

8-cup kitchen range model

SILEX FIRES THE OPENING GUN - A SENSATIONAL UNIT - A SENSATIONAL PRICE - FOR MASS ATTACK ON A VOLUME MARKET

The VICTORY Model is a winner from the word "Go" . . . — it is your opportunity to capture the ever-increasing market for glass coffee makers and to save your otherwise lost metal coffee maker sales.

Price alone would give the Silex VICTORY Model unquestioned leadership . . . — think of it only $2.45 for a full 8-cup kitchen model, the lowest price 8-cup model in Silex history . . . — but on top of that, as ADDED value is the revival of the Charming Old Sandwich Glass design . . . — sturdy, rugged and beautiful Pyrex Brand Glass . . . — this handsome VICTORY Model is low in first cost and low in maintenance cost.

The VICTORY Model is The Silex Company's contribution to the maintenance of the flow of consumer goods which do not interfere with defense production, and at a price that does not encourage extravagance in conflict with the drive for the sale of Defense Bonds.

You can no longer afford to be without an adequate supply of Silex Glass Coffee Makers, they spell VICTORY, sales and more profits for your Housewares Department.

SILEX SELF-TIMING ELECTRIC STOVE For Silex, Cafex, and other glass coffee makers. Insures perfect coffee: brew descends automatically when current is cut off. Individually boxed in colorful cartons. Six to shipping case.

Cat. No. DS8B **Price $2.50** Excise tax extra.

THERE IS ONLY ONE

Genuine SILEX GLASS COFFEE MAKER

TRADE MARK REGISTERED U.S. PAT. OFF.

VICTORY MODEL available only through established Silex distributors

THE SILEX COMPANY, HARTFORD, CONN.

CREATORS OF THE GLASS COFFEE MAKER INDUSTRY

ADVERTISER'S INDEX

The Advertisers' Index is published as a convenience, and not as a part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert.

A

Adam Electric Co., Frank ... 17
All-Steel-Equip Co., Inc. ... *
Aluminum Co. of America ... *
American Coolair Corp. ... 16
American Steel & Wire Co. ... 14
Anaconda Wire & Cable Co. ... 20
Arrow-Hart & Hegeman Electric Co. ... 11
Automatic Electric Heater Co., Inc. ... 93
Automatic Electric Mfg. Co. ... 97

B

Briegel Method Tool Co. ... 94
Bryant Electric Co. ... 8
Bull Dog Electric Products Co. ... *
Burndy Engineering Co., Inc. ... 73
Bussman Mfg. Co. ... *

C

Chicago Transformer Corp. ... 83
Columbia Steel Co. ... 14
Couch Co., Inc., S. H. ... 98
Crescent Insulated Wire & Cable Co., Inc. ... 81
Curtis Lighting, Inc. ... 69

D

Dolph Co., John C. ... 97

E

Edison General Electric Appliance Co. ... 5
Electric Heater Co. ... 95
Electric Vacuum Cleaner Co. ... *

F

Fleu-O-Lier Manufacturers ... 15
Frigidaire Division ... *

G

General Cable Co. ... 10
General Electric Co. (Fluorescent Lighting) ... 7
General Electric (Fluorescent Holders & Starters) ... 86
General Electric Co. (Insulating Materials) ... *
General Electric Co. (Lamps) ... 2 and 3
General Electric Co. (Refrigerators) ... *
General Electric Co. (Water Heaters) ... *
General Electric Co. (Wiring Materials) ... Back Cover
Glass Coffee Brewer Corp. ... *
Globe Lighting Fixture Mfg. Co. ... 88
Graybar Electric Co. ... 18
Greenlee Tool Company ... 87
Gross Chandelier Co. ... 89
Guth Co., Edwin F. ... 22

H

Hazard Insulated Wire Works ... 1
Herwig Co., The ... 92
Hotel Lennox ... 98
Hotel Mayfair ... 96
Hubbard & Company ... 71
Hunter Fan & Ventilating Co., Inc. ... Front Cover

I

Ideal Commutator Dresser Co. ... 92
I. E. S. Better Sight Lamp Makers ... 13
Illinois Electric Porcelain Co. ... 91

J

Johns - Manville ... 6

K

Kelvinator Division ... *
Knox Porcelain Corp. ... *

L

Landers, Frary & Clark ... *
Linemen Protector Co. ... 90
Lloyd Products Co. ... 92

M

Mitchell Mfg. Co. ... 85
Modern Kitchen Bureau ... 77

N

National Electric Products Corp. ... 90
National Transformer Corp. ... 12
Noblitt-Sparks Industries, Inc. ... 74
Norge Division ... *

O

Okonite Company ... 1

P

Paragon Electric Co. ... 93
Premier Division ... *

R

Rogers, C. B. ... *

S

Sangamo Electric Co. ... *
Sherman Mfg. Co., H. B. ... 96
Signal Electric Mfg. Co. ... 93
Silex Company ... 99
Sturtevant Co., B. F. ... 95
Square D. Company ... Inside Back Cover

U

United States Rubber Co. ... 67 and 79
United States Steel Co. ... 14
Uptegraff Mfg. Co., R. E. ... *

W

Walker Brothers ... Inside Front Cover
Ward Leonard Electric Co. ... 89
Westinghouse Elec. & Mfg. Co. (Fluorescent Lamps) ... 9
Westinghouse Elec. & Mfg. Co. (Full Line) ... 19
Westinghouse Elec. & Mfg. Co. (Ranges) ... *
Westinghouse Elec. & Mfg. Co. (Refrigerators) ... *
Westinghouse Elec. & Mfg. Co. (Water Heaters) ... *
Wiegand Co., Edwin L. ... 97
Wiremold Company ... 97

Y

Youngstown Pressed Steel Division ... *
Youngstown Sheet & Tube Co. ... 4